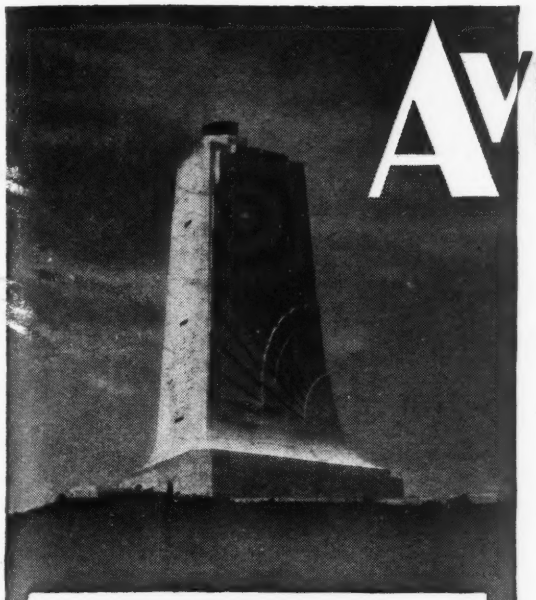

AVIATION

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Volume 46 ● No. 3

FOURTEENTH ANNUAL YEARBOOK ISSUE

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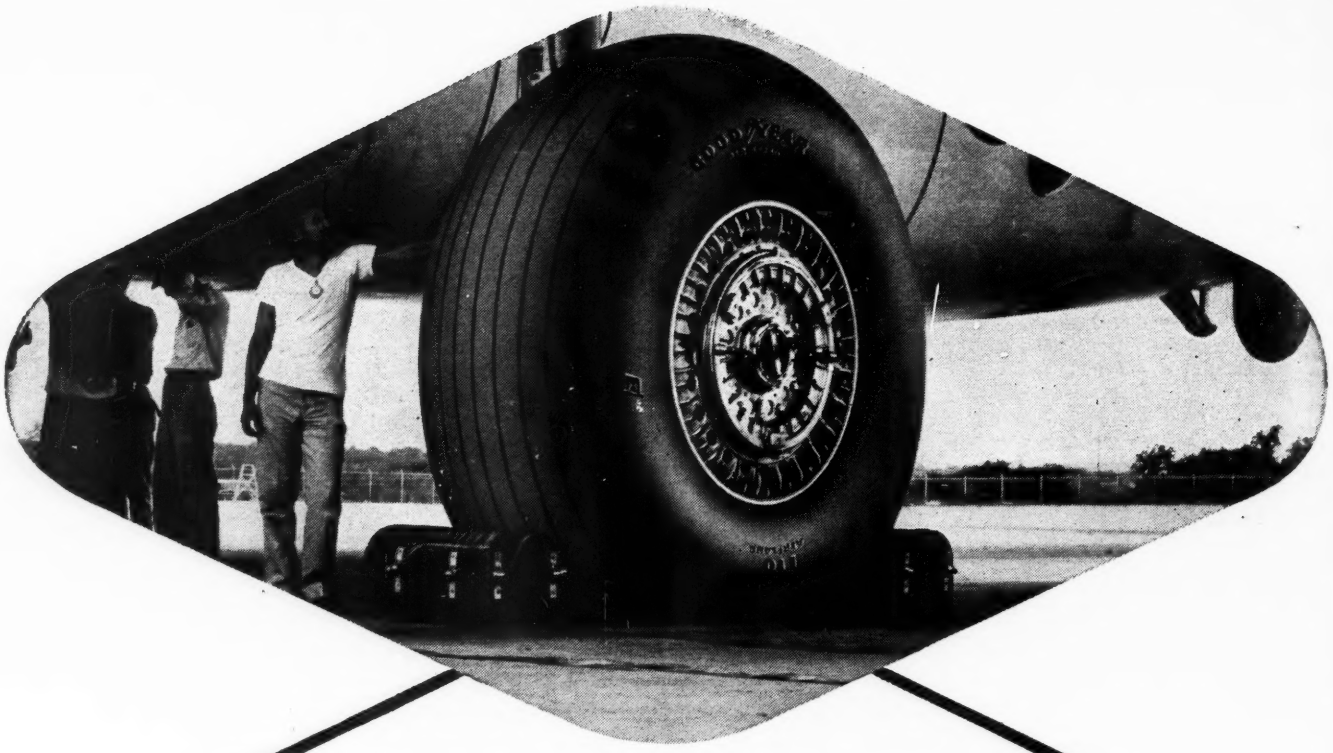

As big as they come!

The mammoth tire you see here is one of the giant Goodyears that carry Consolidated Vultee's new 139-ton XB-36 — the world's biggest bomber. They are the largest airplane tires ever built, stand 110 inches in diameter, contain 34 plies of ultra-strong nylon fabric and weigh 1,500 pounds each. They are mounted on Goodyear wheels, controlled by Goodyear Multiple Disc Brakes. Never before has an airplane tire-wheel-brake unit carried so heavy a load, both in gross weight and in energy-absorption. The ability of the Goodyear unit to handle this load safely is one more proof—verified by long experience—that Goodyear builds the best, whether it is equipment for small private planes or for the biggest craft that fly. For engineering data, write Goodyear, Aviation Products Division, Akron 16, Ohio or Los Angeles 54, California.

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Care and Feeding of Feederlines

SLOWLY BUT STEADILY, feeder airlines are being added to our national network. While it is unquestionably true that some of the regional case decisions involve knotty problems, it is also true that speed in settling them is vitally important. In several regions, operators are pioneering the routes at continual expense to themselves to be prepared to render better service if and when certificates are forthcoming. In the decisions, consideration should be given to those operators who have already demonstrated high efficiency. And CAB should realize that each day's delay will weaken the prospective operator's financial condition.

It is also important that pioneer operators compute their costs most carefully and allow for inevitable increases in expense before determining the rate of mail pay to be requested. Although it is commendable to ask for low rates, it should be remembered that it takes time to obtain an increase if unforeseen events demand it. And overhead keeps marching on.

Experience has indicated the inadequacy of the 25c.-per-plane-mile rate. CAB could save valuable time and operators' resources, and still be acting within the realm of public interest, if new operators were encouraged to allow a reasonable cushion in computing requested rates.

There has been some inclination on the part of CAA to think of feederline operators in the same terms as the scheduled trunk lines. Nothing could be more devastating to a new industry which cannot survive unless its operating costs are substantially lower than that of the trunk lines. Every effort must be made to eliminate all unnecessary expense to operators in compliance with regulations.

Communities and airport executives also should realize that charges against feeder operators must be lower than those for the larger lines. Feederlines contribute to the transportation facilities of any community and must be encouraged, at least during their early growth. Only by close cooperation of all concerned can this new and important experiment in the field of transportation be expected to be truly successful.

Let's Re-Examine the Flying Boat

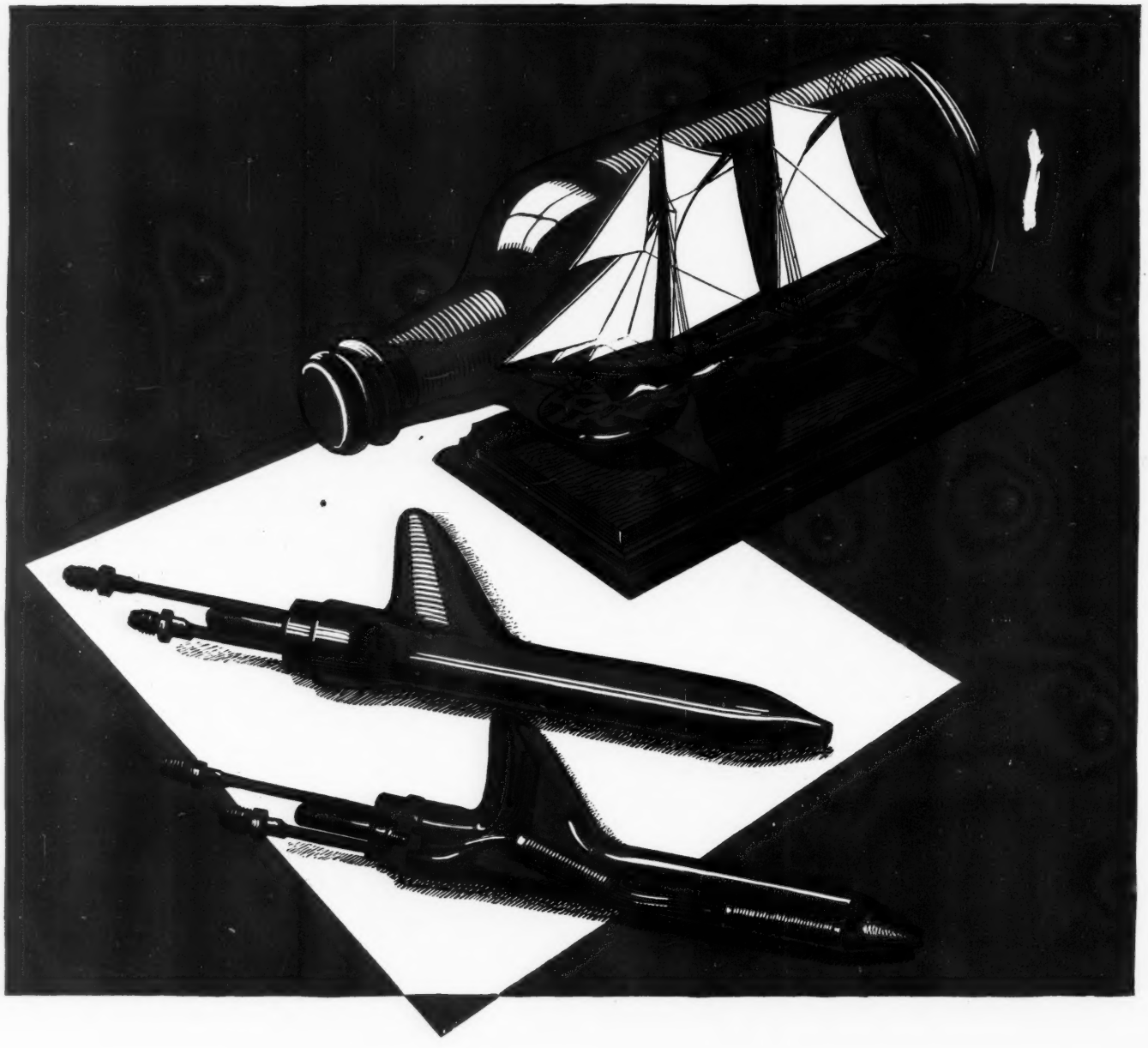
MOST MAJOR AIRLINES have geared their operations to the use of landplanes, even in transoceanic operations, and for sound and sufficient reasons. At the same time, they are gravely concerned, or should be, over the rapidly rising cost of large airport facilities and the increasing distance of landing areas from cities' centers. These two facts add up to something which will probably sound heretical to the operations engineer: It is time to re-evaluate the seaplane.

Each major city and most minor ones have almost unlimited runway areas on the waterfronts at their very doorsteps. No matter what happens, it is most unlikely that airlines will escape sharing some part of the rising cost of land terminals. And ground transportation to airports grows more complex every day.

In the meantime, real progress has been made toward greater efficiency in the design of flying boats and seaplanes. Some progressive operator with an open mind should start immediately to survey the realistic future cost of terminal facilities and, in this respect, appraise the increased utility of water craft.

Leslie E. Neville

EDITOR.



Building the bottle around the ship...

The ship-in-a-bottle puzzle is easily solved upon observation. But the enclosure of half a dozen elements within the Kollsman pitot tube has baffled many. There is no apparent way by which they could have been inserted . . . except, as some have jokingly observed, "to build the bottle around the ship"! That is precisely how it is done, the internal elements of the tube being cast in a fusible mould, the mould heavily electroplated, and the mould material melted out. This is but one of many Kollsman techniques developed to solve special problems in flight instrumentation and control.

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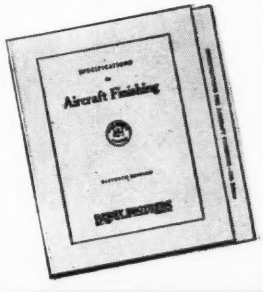

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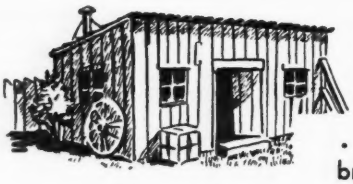

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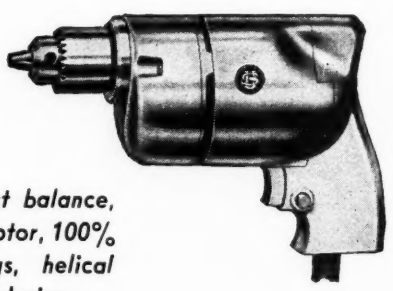

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For nearly a quarter of a century, Fairchild engineers have worked to make the airplane more efficient, more useful. In the Packet they built the first plane designed specifically to carry military cargo. But engineering ingenuity gave it as well the ability to fulfill *many* of the rapidly shifting requirements of modern military operations.

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Division of Fairchild Engine & Airplane Corporation, Hagerstown, Maryland

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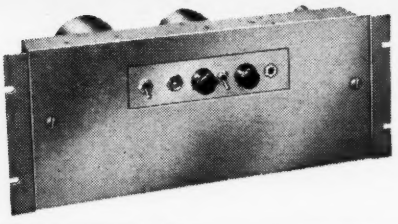

by suppressing radio interference, with FEDERAL's VHF RADIO RECEIVER 139-B

TO THE MEN who operate these nerve centers of the airports, local radio interference is still a major problem. That's why they will welcome Federal's new VHF radio receiver 139-B—for it is especially designed to suppress radio interference from unshielded ignition systems of ground vehicles and small planes. This is accomplished by a peak-clipper type noise suppression circuit which brings in the signals with greater clarity—permitting reception under higher noise levels, thus adding greater communication efficiency. Write today for complete information. Dept. A476.

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1. Designed for mounting in 19-inch relay rack
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9. All adjustable elements accessible without removal of other assemblies
10. Low oscillator radiation.

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Power output	1 Watt
Frequency range	118 to 136 MC
Power input	70 Watts, 115/230 Volts, 50-60 Cycles
Dimensions	19" long by 7" high by 9" deep

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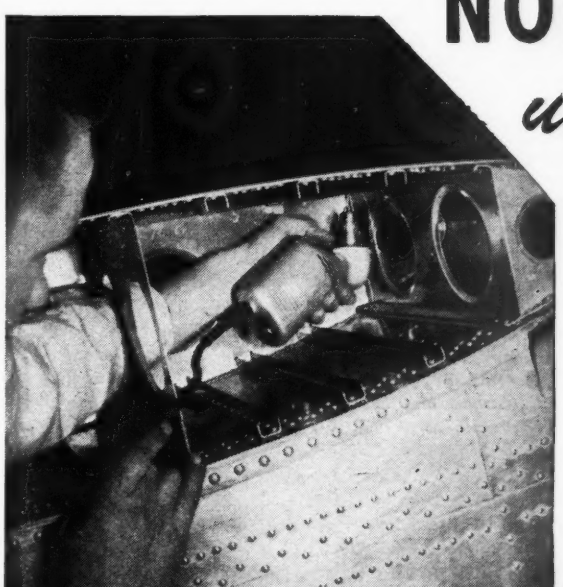

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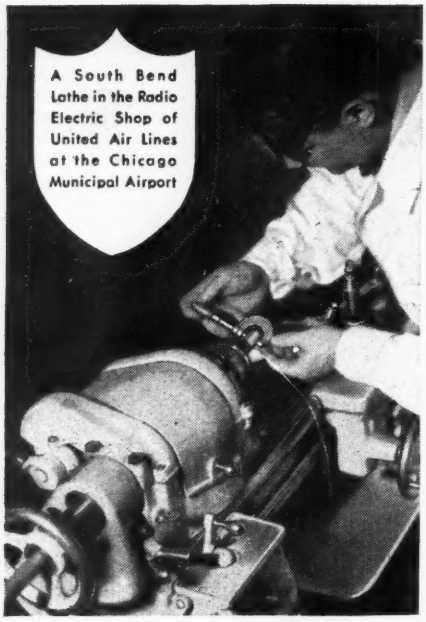

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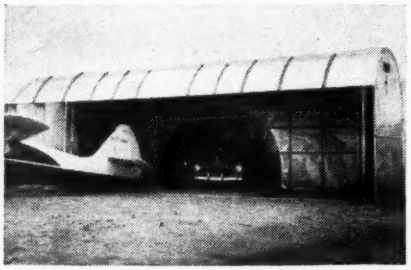
. . . Key facts on the latest devices and equipment, tools and materials, product-and-practice literature. For additional data on any item, or copies of literature, simply fill in handy form (page 17), clip it to your letterhead and mail to AVIATION Reader's Service. There is no cost, no obligation.

Airplane Hangar 1

Having a length of 40 ft. 10 in., depth of 29 ft. 6 in., and height of 9 ft. 4 in., and affording a floor space of 800 sq. ft., new "Mono-T", all-aluminum semi-monocoque T-shaped hangar for housing lightplanes has been designed by **Unit Fabrication Co.**, Los Angeles. In photo, car inside of stem of "T" shows depth. Accordion folding doors open to 39 ft.

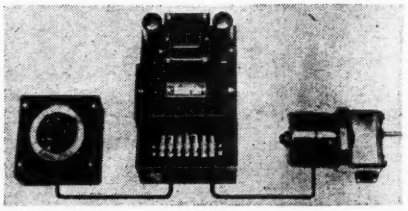


Intercommunicating Set 2

Powered with two standard flashlight batteries totaling 3v., new intercommunicating "Handi-Phone", designed to facilitate training of pilots, is announced by **Wm. J. Murdock Co.**, Chelsea, Mass. Used in combination with a headset worn by student pilot, it is stated to permit instructor to speak in normal tones and be heard by student under conditions involving high noise levels. Unit is made of molded plastic, with a snap action press-to-talk switch, transmitter, transformer, and jack. Weight is 10 oz.

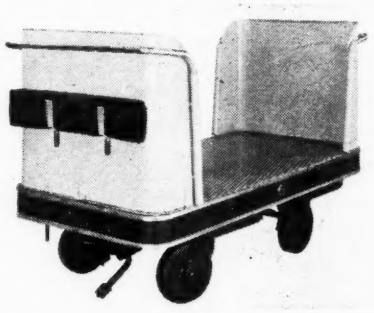
Remote Control Unit.....3

Developed by **Yardeny Laboratories**, New York City, "Synchro-Link", is a remote positioning control that will position one or a number of distant motors according to setting of control transmitter. It can be used with fractional or integral hp. motors and is stated to have accuracy of better than 1% of full range independent of load. Two adjustments are provided: (1) A sensitivity control to permit adjustment of accuracy or dead zone—that is, allowable motion of control shaft before correcting action of motor is initiated; and (2) an anti-hunting control for adapting characteristics of system to different values of inertia of motors and loads in various applications. Unit, working on principle of self-balancing electronic bridge, consists of three elements: (1) Master control with a knob and a calibrated dial for manual control, or a ¼ in. shaft extension for automatic control; (2) electronic controller; and (3) load potentiometer geared to motor or coupled to load. Motor is not supplied with unit, but any reversible motor can be used. Controller contacts will handle 15 amp., 110v., a.c. or 10 amp. 220v., a.c. Motors up to 1/10 hp. can be directly connected; motors from 1/10 to 35 hp. use magnetic reversing starter. Several units can be so connected that a single master control operates all slave units. Power requirements are 115v., 60 cycles, a.c.



Baggage Cart 4

Having a 2-ton load capacity and designed to be used in trains, in single units or with fork lifts, new steel fabricated baggage and cargo cart has been developed by **Airquipment Co.**, Burbank, Cal. A retractable hitch and two swivel casters permit tracking of maximum 76 deg. when in train. Box sections incorporated in truck bed provide fork lifting facilities. Bed top of unit is aluminum diamond plate. Removable ends permit handling long loads. Waterproof canvas cover can be



snapped in position for weather protection. A two-way brake provides snubbing action to reduce speed as well as giving lock for parking. Safety reflectors are installed on each side. Unit is 3 ft. wide, 6 ft. long, and 3 ft. 9 in. high.

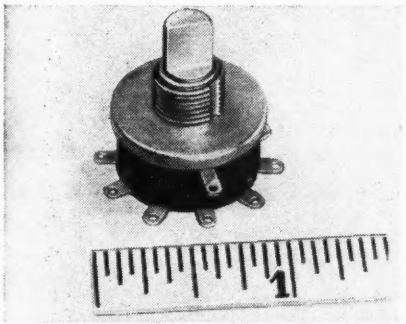
Pallet Lift Truck.....5

Offering new design, construction, and operational features, one-ton capacity hand pallet lift truck is offered by **Lyon-Raymond Corp.,** Greene, N. Y. All working parts are enclosed. Frame is made of alloy sheet steel formed into

box sections. Aluminum alloy is used for wheels and other non-structural parts. Maker says two men can load unit from ground level into highway truck. Elevation is accomplished through foot pump, length of stroke being optional with operator. Lowering is accomplished by pushing foot pedal forward. Pump is equipped with relief valve to prevent overloading.

Roto Switch 6

Having a contact pressure of 2½ lb. and measuring ¾ in dia. and 13/32 in. in depth, new Series 5000 roto switch, developed by **Grayhill,** Chicago, can be



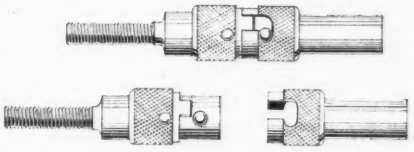
used in almost any circuit combination up to 5 amp., breaking up to 1 amp. at 110v. Featuring 360 deg. rotation in either direction, switch can be moved from one position to another by turning through least number of positions. It is available in both shorting and non-shorting types, and shafts for either knob or screw adjustments are provided.

Filter Capacitors 7

Developed for wartime applications in attenuating radio interference from motors, generators, and other electrical equipment, and available in values up to 0.75 mf., new network filter capacitors, stated to be capable of continuous use at currents up to 100 amp. with line voltages up to 250v. a.c., have been released for general use by **Solar Mfg. Corp.,** New York City. Hermetically sealed, they are furnished in corrosion-resistant metal housings.

Control Rod Disconnect.....8

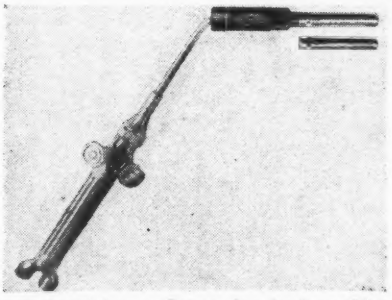
Designed to speed up removal and installation of aircraft power plants and assemblies through quick disconnection of control rods and readjustment of rod length, and to operate under a 25-lb. continuous rigging load and a 150-lb. operating load, new control rod disconnect unit is made for and distributed by **Durham Aircraft Service,** Flushing, N. Y. Six models are available, incor-



porating three styles of ends. Unit has been accepted for installation on civilian planes by CAA, has passed tests by Navy, and has been used in control assemblies of Republic Rainbow and Thunderjet, Piasecki Army helicopter, and Kellet helicopter.

Soldering Attachment 9

Affording double duty for oxy-acetylene welding torches, new soldering attachment which fits over end of any standard welding torch tip, is announced by **Cesco Products, Inc.,** Chicago. It is used with acetylene alone



and provides a flame for body soldering, tinning, silver soldering, and heating jobs. Two tips are furnished with kit, one for light duty and one for body soldering.

Air-Cooled Compressors 10

Incorporating aluminum alloy compressor heads and manifolds to obtain cooler compressor operation and freedom from valve carbonizing, new line of air-cooled portable compressors announced by **Davey Compressor Co.,** Kent, Ohio, includes five models of 60, 105, 160, 210, and 315 cfm. capacity. All units are of V-type design, except 315 cfm. model which is of "W" construction with four low pressure and two high pressure cylinders. Units operate at relatively slow piston speeds through use of short piston strokes (4½ in. for 60 and 105-fm. models; 4 in. for 160, 210, and 315 cfm. units). Other features include crankshaft mounting on heavy duty double-row ball bearings, full force feed lubrication, and individual air cleaners for each low pressure cylinder. Last named feature is to provide greater

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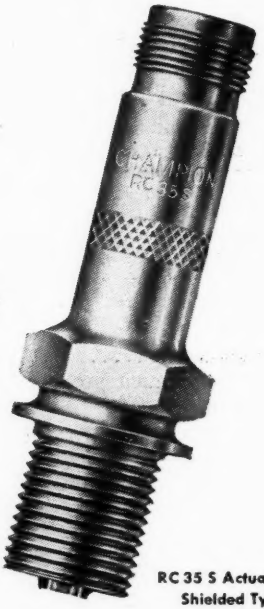
Actual Size 2⅜"

CERAMIC AIRCRAFT SPARK PLUGS



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THAN ALL OTHERS COMBINED!

Overwhelming acceptance in every engine field has made Champion "America's *Favorite* Spark Plug." This preference, of course, includes all types of aircraft—commercial, personal and military—where dependable Champion Spark Plugs are used in the vast majority of engines. Install Champions and fly with confidence! Champion Spark Plug Company, Toledo 1, Ohio.

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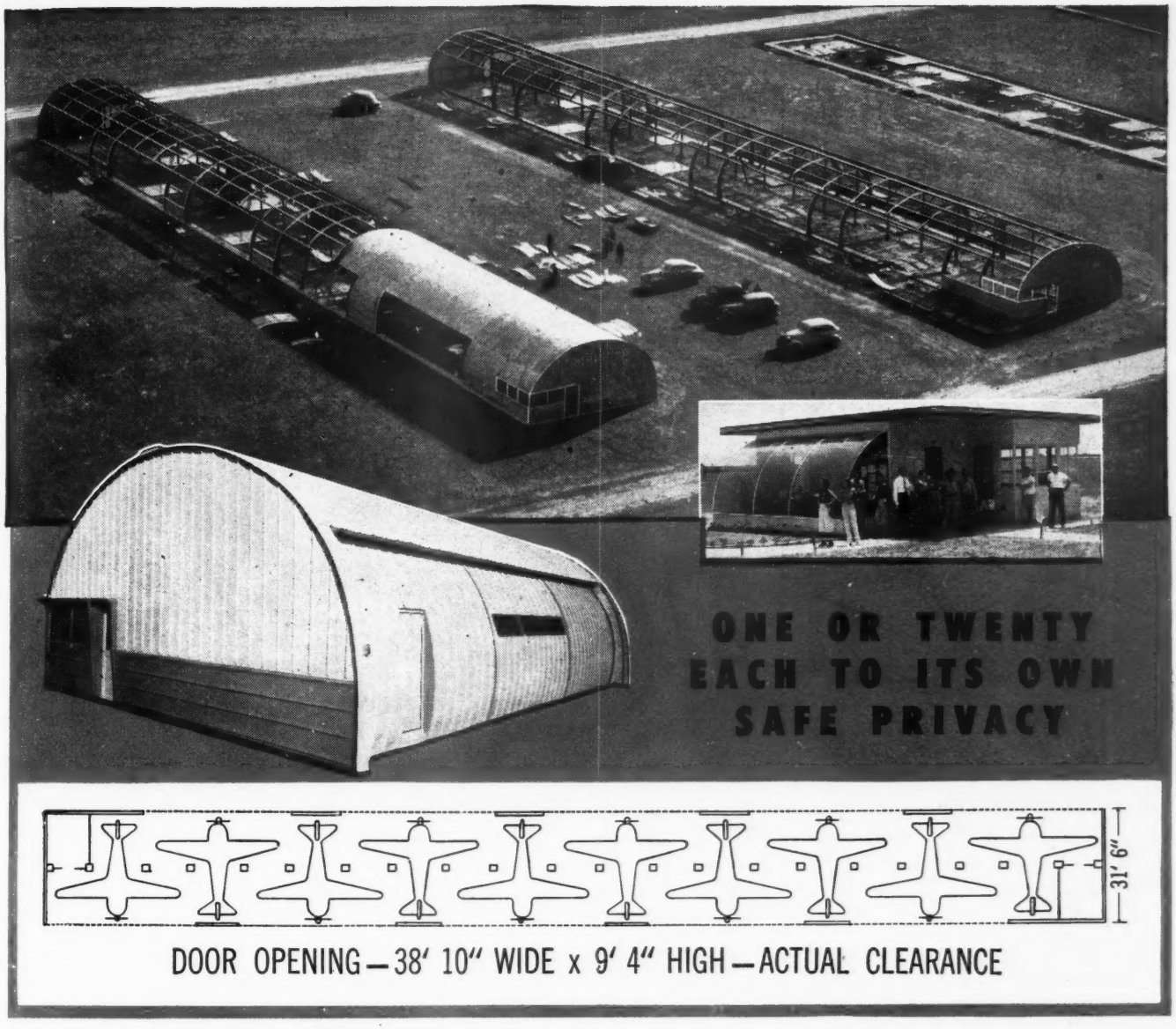


BUTLER BUILT RADIAL HANGAR

Reg. U. S. Pat. Off.

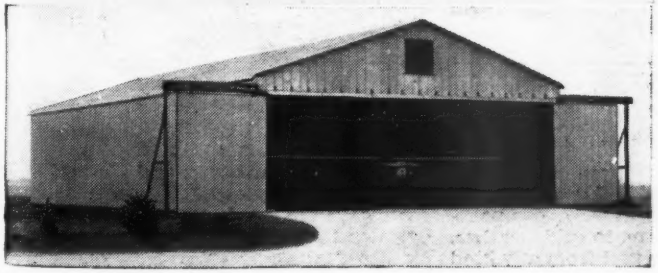
Up they go, on more and more of the smartly designed airports and airparks, to give airplanes the finest protection—against fire and the elements—against the inconvenience and hazards of handling in and out of public garage type hangars. Yes, Butler Radial Hangars, with the overhead type doors, (single and multiple units) are rolling off the production lines at a faster pace.

Backlogs are disappearing. Come Spring clean-up time on the airports, reasonably prompt delivery of Butler Radial Hangars can be expected—providing, of course, no further delays in steel deliveries develop.

But remember! If a substantial part of the orders we couldn't accept last year are re-offered another backlog can quickly build up. So, if your Spring airport clean-up or build-up calls for hangars, put your bid in now for the class of the airfields—Butler Radial Hangars. The same sound advice applies also to Butler Built Administration Buildings.

BUTLER BUILT CONVERTIBLE

Also in production, this Truss-Clear, rigid frame hangar with clear span of 37' 4", door height of 12'. Top notch for storage of small planes. Convertible later for repair or dope shop.



BUTLER MANUFACTURING COMPANY

Factories: Kansas City, Galesburg, Minneapolis

For Prompt Handling address Inquiries To

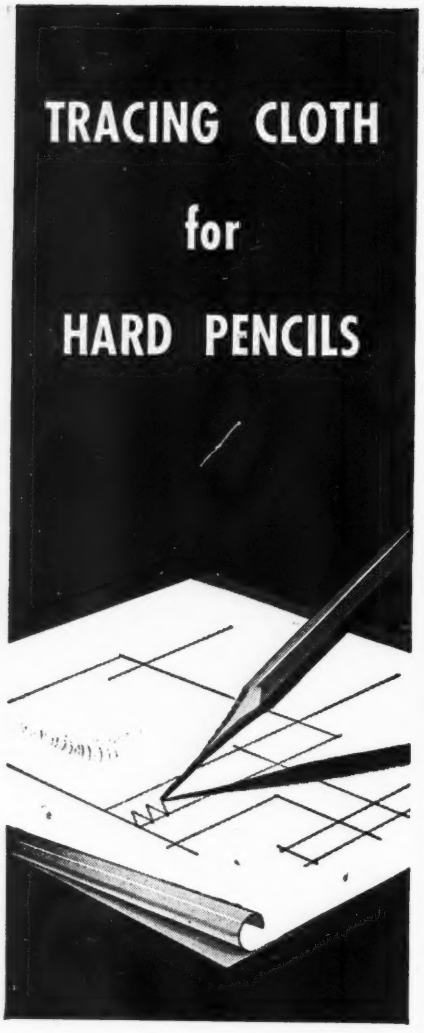
7406 E. 13th St., Kansas City 3, Mo., or
906 Sixth Ave. S. E., Minneapolis 14, Minn.

Send complete information on ☐ Radial Hangars ☐ Administration Building ☐ Convertible Truss-Clear Hangar.

Firm Name _____

Address _____

City _____ State _____



● Imperial Pencil Tracing Cloth has the same superbly uniform cloth foundation and transparency as the world famous Imperial Tracing Cloth. But it is distinguished by its special dull drawing surface, on which hard pencils can be used, giving clean, sharp, opaque, non-smudging lines.

Erasures are made easily, without damage. It gives sharp, contrasting prints of the finest lines. It resists the effects of time and wear, and does not become brittle or opaque.

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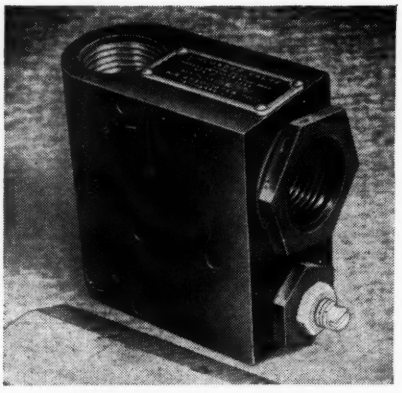
IMPERIAL PENCIL TRACING CLOTH

SOLD BY LEADING STATIONERY AND DRAWING MATERIAL DEALERS EVERYWHERE.

cooling of cylinders and heads during compressor idling periods. New models are available in industrial departmental, skid, steel wheel, pneumatic tired trailer, and flanged wheel units. They are also available in truck and tractor mountings.

Unloader Valve 11

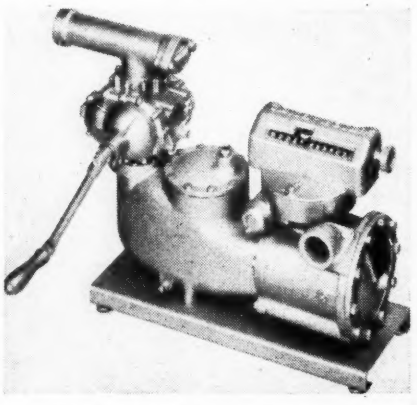
Developed to provide pressure regulation at 3,000 psi. operating pressure without severe shock loads accompanying cut-in and cut-out action, new unloader valve, HC-3600, which may be classified as a throttling type, is announced by **Air Associates,** Teterboro, N. J. During cut-in procedure, poppet travels up stream to shut off by-pass flow, automatically cushioning movement since dynamic flow opposes move-



ment of poppet. Enabling use with or without an accumulator, it is said to be capable of handling up to 20 gpm. flow without excessive pressure drop. Designed for use with AN-VVO-366 hydraulic fluid, unit contains packing seals in accord with specification AN-6227. Maker states actual measured pressure drop through system port measured 46 psi. at 16 gpm., 59 psi. through return port at same flow, and that unit may be adjusted for operation between 1,500 and 3,000 psi. cut-out pressure with a differential of about 10% of cut-out pressure. Ruler in accompanying illustration shows small size of unit; weight is 11 oz.

Portable Fueler 12

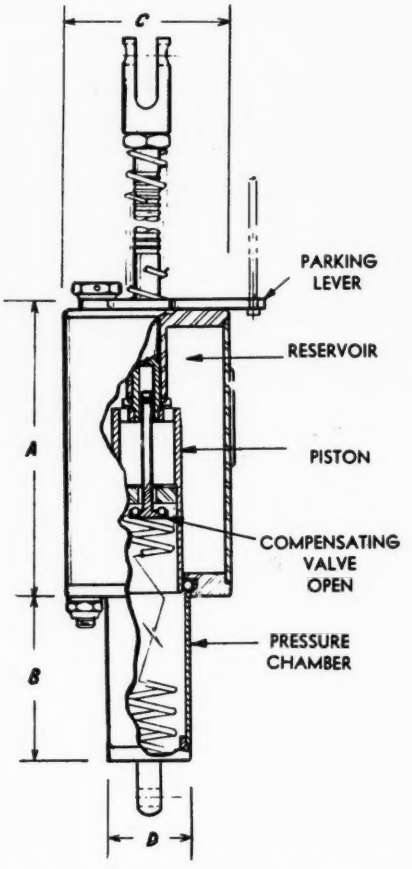
Made to be used at fixed location or mounted on tank of any type of vehicle, new "Handpack" gasoline dispenser now



being offered by **Smith Meter Co.,** Los Angeles, features portability, compactness, and quick starting in cold weather. It is stated to deliver fuel from any kind of container metering up to 30 gpm., with no auxiliary power required. Complete combination includes aluminum rotary meter with 1¼ in. outlet, air eliminator, strainer, built-in back pressure valve, and hand pump. Unit measures 22 in. long, 9 in. wide, and 17 in. high, and it weighs about 50 lb.

Brake Master Cylinder.....13

Developed to serve as a vertical pressure cylinder, a fluid reservoir, and a brake lock for light aircraft, new three-purpose hydraulic master cylinder made

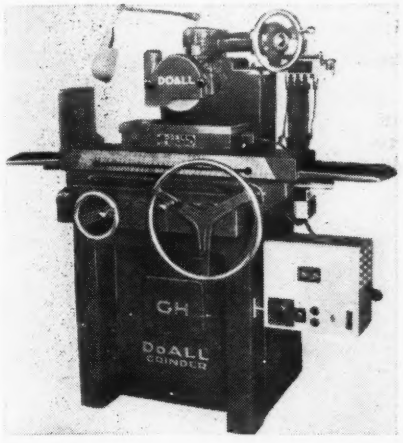


by **Herman Machine & Tool Co.,** Tallmadge, Ohio, is stated to hold a parked plane without use of chocks, and parking brake cannot be released accidentally. Brakes can be locked automatically at any pressure desired and be released by pressure on brake pedal. Brakes are locked by depressing pedal and pulling wire on instrument panel which operates locking lever securing brakes. Brakes are released by depressing pedal. Cylinder is made of lightweight steel assembled by electronic brazing. Two-thirds of parts are interchangeable among various-sized models offered by company.

Surface Grinder 14

Featuring improved table action by means of hardened gears running in needle bearings driven by a 16 in. hand wheel and 1 in. cross feed screw located in center of saddle, new Model GH hand operated tool room surface grinder is announced by **The DoALL Co.,** Des Plaines, Ill. It has V-ways between saddle and base and one flat and one V-way between table and saddle. All ways are hand scraped and are lubricated by a gravity feed oil system. Another feature is cartridge type direct

drive spindle which has ball bearings throughout with automatic take-up for wear. Direct coupled 1 hp. motor and spindle are enclosed and are balanced statically and dynamically. Machine has a one piece base and column support construction with column extend-



ing from bottom of base up to spindle. Elevating screw and cross feed screw operate through 4 in. bronze nuts. Hand wheel for spindle elevating screw is graduated in half thousandths with vernier adjustment to .0001 in., and cross feed hand wheel is graduated in thousandths with vernier adjustment to .0001 in. Working area of table is 6½ x 19¾ in. with maximum work height of 12 in. using standard 7x½ x 1¼ in. grinding wheel. Electro magnetic chucks, a.c.-d.c. rectifiers and demagnetizers, dust collectors, grinding wheels, and wheel dressing diamonds are available for this machine.

Voltage Regulator 15

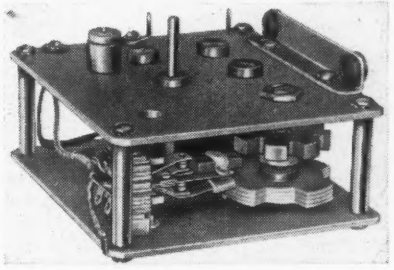
Designed for aircraft use, new Model D-500 is addition to line of voltage regulators made by **Sorensen & Co.**, Stamford, Conn. Unit employs fosterited transformers and is hermetically sealed to withstand climatic conditions. It has frequency range of 360-500 cycles, input voltage range 95-125, output voltage range 110-120, and load range 50-500 va. Regulation accuracy is said to be 0.5% with harmonic distortion less than 5%, and transient recovery time is put at about 4 cycles. Unit is designed to withstand ambient temperature range of minus 55 deg. to plus 70 deg. C. It weighs 12.5 lb.

Adjustable Drill Head.....16

Made to be attached to any drill press, new eight spindle, "Multi-Drill", adjustable drill head announced by **Commander Mfg. Co.**, Chicago, is stated to drill eight holes in one stroke in any hole pattern on or within a 9-in. circle with minimum center-to-center distance of ½ in. Hole pattern is accomplished by loosening one nut on each locating arm, positioning spindle, and tightening nut. Housing and gear case are made of aluminum alloy, gears are hardened and ground, and universal joints are of high torque block type construction.

Constant-Speed D.C. Motor.....17

Utilizing principle of polarized magnetic drive of a vibrating reed—nucleus



of speed control under d.c. power which results in an attraction and repulsion force assuring self starting—improved model of constant-speed d.c. motor is

(*Turn to page* 144)

AVIATION READER'S SERVICE MARCH 1947

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Silicone News

DC SILICONES

DC Silicone Insulation saves space and weight in aircraft industry

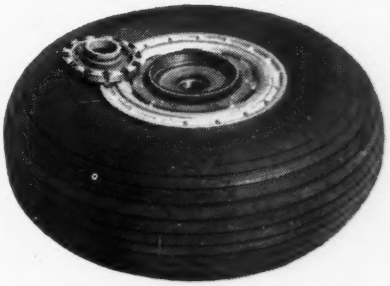


PHOTO COURTESY WELLS AIRCRAFT PARTS CO.

When big transport planes land at 90 mph, the friction required to get the wheels turning at landing speed wears out the tires rapidly and puts a great strain on the landing struts. That's why so much time and money have been spent on various devices for pre-rotating aircraft wheels.

Most recent and promising is a Silicone insulated ring-type motor designed by Otto E. Dever of Los Angeles and built by Wells Aircraft Parts Co., also of Los Angeles, for flight testing on the Lockheed "Constitution."

The Dever Pre-rotation Motor weighs less than 14 pounds and is designed as an integral part of the wheel. The motors built for the Constitution deliver 9 hp in accelerating the wheels to a landing speed of 630 r.p.m. in two minutes. Since that speed must be maintained within 5% for just a few minutes, these motors work hard but briefly.

Probably Class "B" insulation would withstand such severe but intermittent service for a limited time. There would be little economy, however, in having to rewind the motors after a few landings. By specifying DC Silicone Insulation, Mr. Dever recognizes the difference between war and peacetime economies.

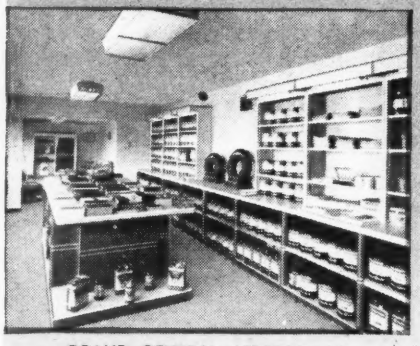
During the war, aircraft motors and generators were built to save space and weight at the expense of service life. That was good wartime economy but it is not sound commercial practice.

The introduction of Dow Corning Silicone insulation makes it possible to reduce the size and weight of electric machines by about 50% and still secure long and reliable service, even under conditions of extreme humidity. More information about DC Silicone Insulation is given in leaflet No. G 3-5.

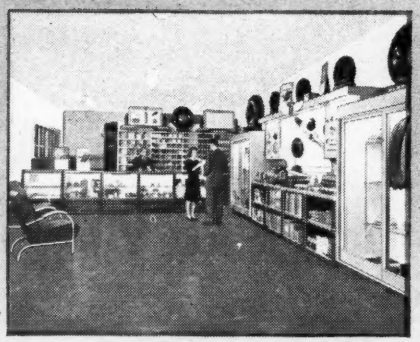
DOW CORNING CORPORATION
MIDLAND, MICHIGAN
New York • Chicago • Cleveland • Los Angeles
In Canada: Fiberglas Canada, Ltd., Toronto
In England: Albright and Wilson, Ltd., London

Dow Corning
FIRST IN SILICONES

Why MORE AIRCRA Firestone



GRAND CENTRAL AIRPORT CO.
Glendale, Calif.



LANE AVIATION CORP.
Columbus, Ohio

SIMSBURY FLYING SERVICE
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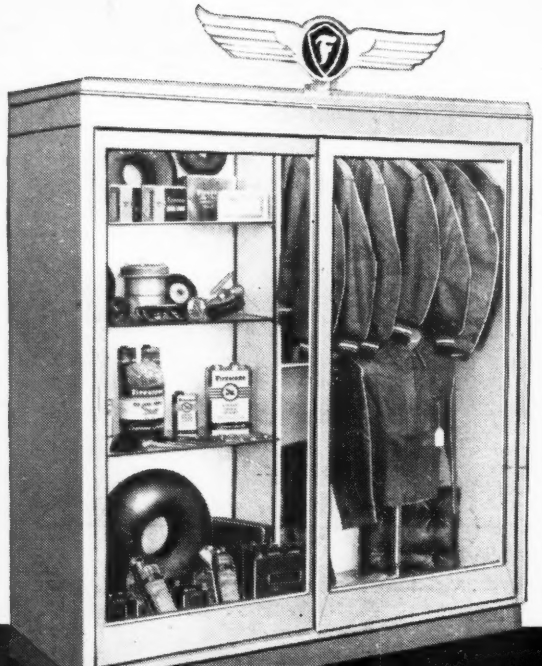
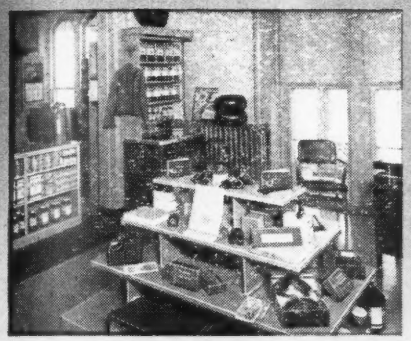
BEST TODAY··· STILL BETTER TOMORROW



AFT DEALERS SELL
PRODUCTS



SKY SUPPLY, INC.
Roanoke, Va.

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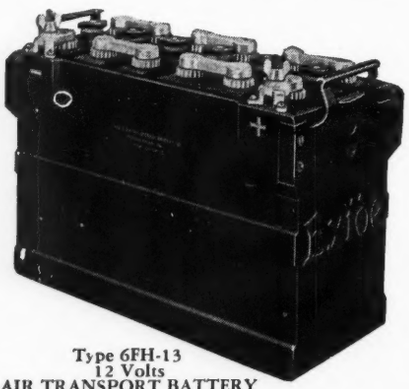
WHY? Simply because aircraft dealers serve the public better with the Firestone Franchise. There is a greater public acceptance for Firestone products than any similar line. Aircraft dealers know that Firestone was the first to provide an extra-quality line of these aircraft accessories that enable the aircraft dealer to meet the requirements of his customers from a single source of supply.

Above are shown six Firestone Aircraft Dealer Stores that are typical of hundreds of dealers in every section of the United States. If you are interested in expanding your airport business, in making more sales contacts, in earning greater income, write, wire, or phone Firestone at Akron, Ohio, for more complete details on the Firestone Aircraft Franchise.

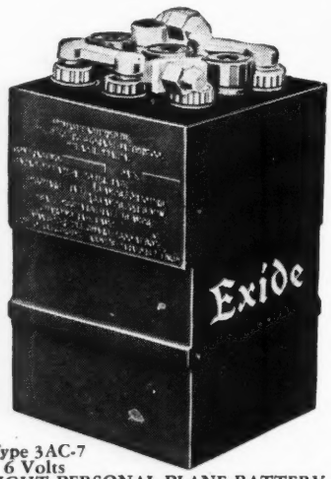
Listen to the Voice of Firestone every Monday evening



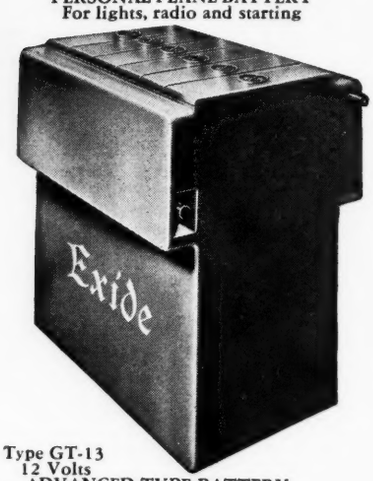
Type 6FH-13
12 Volts
AIR TRANSPORT BATTERY
Used by leading airlines

Type 6TS9-F
12 Volts
PERSONAL PLANE BATTERY
For lights, radio and starting

Type 12TS-9L
24 Volts
MILITARY TYPE BATTERY
For converted
Government planes



Type 3AC-7
6 Volts
LIGHT PERSONAL PLANE BATTERY
For ignition and small lighting loads



Type GT-13
12 Volts
ADVANCED TYPE BATTERY
Used in Jet-propelled planes

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More planes . . . commercial, military and personal . . . are equipped with Exide Aircraft Batteries than with any other make. This outstanding preference is due to several factors, including:

. . . Long experience, dating back to pioneer days, in building aircraft batteries, plus a progressive policy that has kept pace with aviation's constantly changing needs.

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. . . A wide range of types . . . with Exide Aircraft Batteries specially designed for every kind of service.

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 32 • Exide Batteries of Canada, Limited, Toronto

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New B. F. Goodrich assembly gives maintenance men a break

THE Braniff International Airways mechanic shown in the picture is completing one of the easiest of his maintenance duties. He's just overhauled a B. F. Goodrich Expander Tube brake. The mechanic likes the brake because he doesn't have to tear the whole thing down to replace the brake lining, and he doesn't need a lot of special tools to do the work.

The engineers at Braniff like the extremely low maintenance cost. There are two reasons why that cost figure is so low. The brake needs *less* maintenance when it is in the shop, and it is in the shop less often than other type brakes. One reason for this is that a hydraulically operated tube forces brake blocks against the brake drum *evenly* all the way around. This results in powerful action with minimum pressure and minimum wear.

The designer likes the simplicity of design for another reason. The B. F. Goodrich Expander Tube brake can be made lighter for a given amount of kinetic energy than any other type brake. From the Lockheed Constitution to the Piper Cub, this advantage has proved itself on every type of modern aircraft.

B. F. Goodrich Silvertown tires, wheels and brakes are now sold as a complete assembly—an important new service to airlines and to manufacturers. *The B. F. Goodrich Company, Aeronautical Division, Akron, Ohio.*

B.F.Goodrich

FIRST IN RUBBER

GREATER MARGIN OF POWER FOR AIRLINE OPERATION

With New 2500 *Horsepower* *Wright* CYCLONE 18BD

★

THE WRIGHT AERONAUTICAL CORPORATION announces a new, post-war commercial aircraft engine, the 2500 horsepower CYCLONE 18BD as the next step in the development of "Power for Air Progress."

> *This new model, now in production for the new Lockheed Constellation, incorporates many advancements to provide greater power and reliability in airline operation.*

The increase in horsepower to 2500 makes the CYCLONE 18BD the most powerful 18 cylinder engine in the world. Among its many new design features are a *Cylinjector system*—the direct injection of fuel into each cylinder; *low tension ignition* for improved performance at altitude; *piston oil jets* for prolonged piston and ring life; *forged aluminum cylinder heads with differential finning* for greater cylinder strength and improved cooling; and *automatic spark advance* for cruising economy.

Although it is a direct descendant of the earlier CYCLONE 18 engines that have broken 98 world records for long distance, altitude with load, and speed with load, the CYCLONE 18BD is the newest model specifically engineered by Wright for commercial transports.

WRIGHT
AERONAUTICAL CORPORATION
WOOD-RIDGE, NEW JERSEY
A DIVISION OF
CURTISS WRIGHT
FIRST IN FLIGHT

POWER FOR AIR PROGRESS

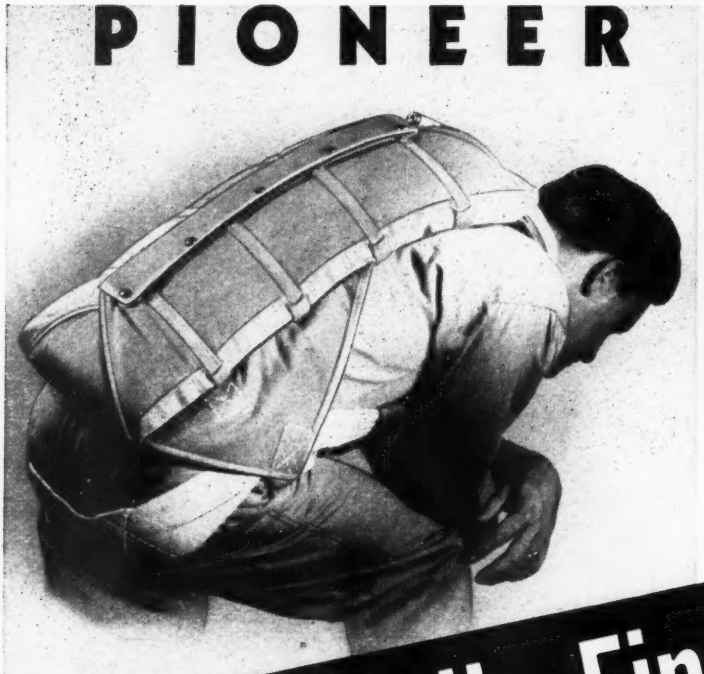
The Tudor spirit lives again

A. V. ROE & CO. LIMITED, MANCHESTER, ENGLAND (Branch of Hawker Siddeley Aircraft Co. Ltd.)

AVRO

TUDOR II

PIONEER P3-B



The World's Finest Parachute

** Patents applied for in U. S. and all principal countries throughout the world.*

EXCLUSIVE QUICK FIT* HARNESS . . . enables the wearer, regardless of size or weight, to adjust the harness to perfect fit in less than three seconds. The Pioneer P3-B can be slipped on . . . easily and quickly . . . whether you are seated in the plane or in a standing position. Perfect fit is achieved by a quick tug at chest and leg straps.

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FOOL PROOF, FOUL-PROOF PILOT CHUTE . . . an exclusive Pioneer development always provides instant, positive performance.

PROVEN SUPERIORITY . . . developed through years of experiment and research, the Pioneer P3-B is preferred by leading test pilots, flyers and technicians. Before you buy, inspect the Pioneer P3-B . . . the finest in parachute equipment.

Pioneer Parachute Company, Inc., is a Selling Agent for Surplus Parachutes of the U. S. War Assets Administration.

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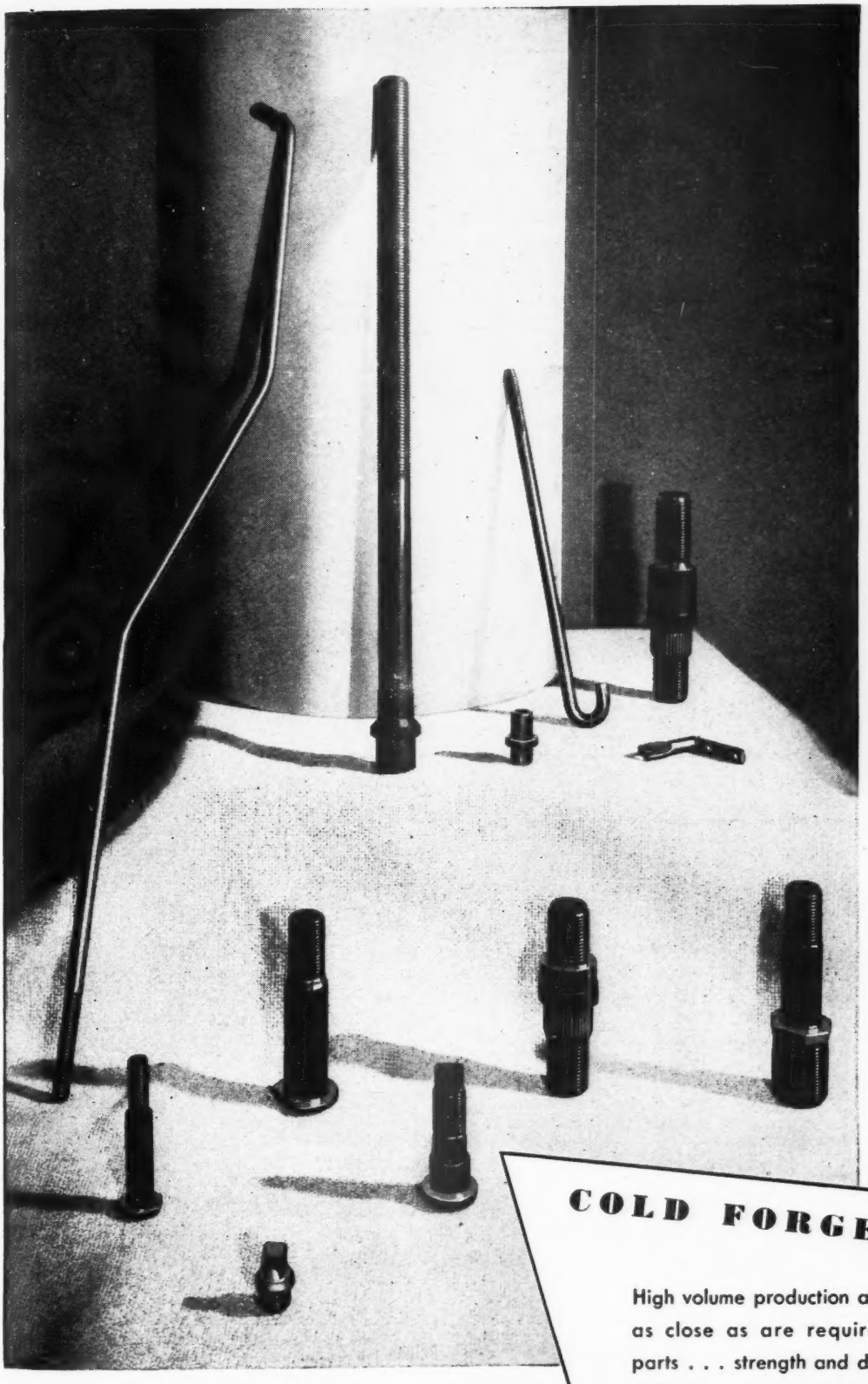

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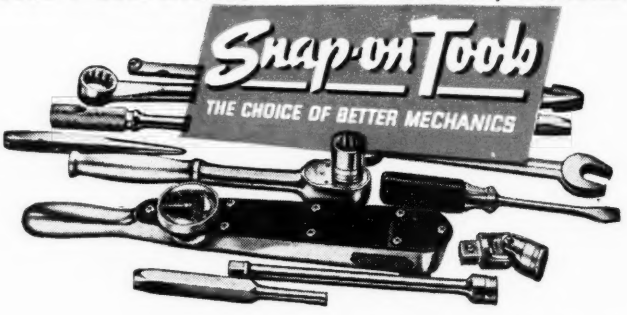
MID CONTINENT
AIR LINES
Skilled mechanics at Mid-Continent Airlines use Snap-on tools to help them continue this airline's rigid standard of maintenance.
When you're glad you have a Snap-on

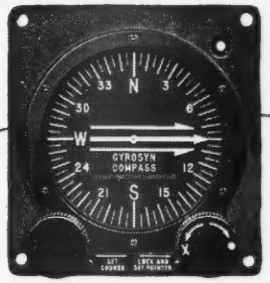
. . . installing check valve on the hand hydraulic pump with a Snap-on — Blue-Point BOXOCKET

Snap-on's Blue-Point Boxockets are *safety tools* with the combined advantages of powerful leverage and extra strength. They completely encircle the nut on all six corners . . . and because of their double broaching, they need only half the space of an end wrench when handle movement is limited. In addition, Snap-on — Blue-Point Boxockets give you two important safety features . . . they cannot slip off or spread on the nut . . . the handles are angled to give clearance from obstructions and prevent skinned knuckles. Complete range of sizes from 3/16" to 3 1/8".

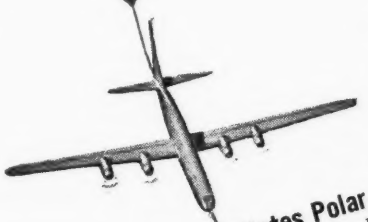
Boxockets are only a part of Snap-on's complete line of quality tools for aviation maintenance available through Snap-on's nationwide, direct-to-user tool service. "Ask your Snap-on man" . . . or write for new, complete catalog of Snap-on tools.

SNAP-ON TOOLS CORPORATION
8020-C 28th AVENUE KENOSHA, WISCONSIN

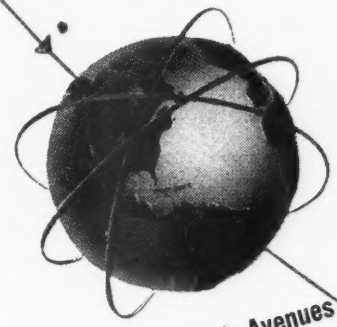




The Sperry Gyrosyn Compass . . .
is a stable directional indicator under all conditions of air turbulence. It does not oscillate, swing or have northerly turning error.



. . . that facilitates Polar Navigation . . .
for the Gyrosyn Compass indicates magnetic heading accurately even when the horizontal component of the earth's magnetic field is very low. In polar regions where magnetic heading is difficult to use for steering, the Gyrosyn Compass may be used as an accurate directional gyro.



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AND IN THE MARINE FIELD, Sperry Radar and Loran, are piloting ships on safer, shorter courses through every kind of weather.

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. . . . . we thought EVERYBODY knew we furnish alloy steel in forging ingots and blooms

IMAGINE our embarrassment when we discovered the other day that one of our customers, who's been buying Carilloy Steel bars and billets from us for years, had been going elsewhere for large rolled blooms and forging ingots—because he didn't know we produced them for sale.

We're inclined to believe this man is a rare exception. But just to be on the safe side—and in case YOU missed our story in the past—we're going to repeat what we've been telling steel users year after year. Namely:—

"Carnegie-Illinois is prepared to furnish constructional alloy steels in ALL forms. Not only in the usual bars and billets but in strip, sheets, plates, sketch plates, structural sections, coiled bars, spring flats, special sections and in large rolled and forged blooms and forging ingots as well—either in electric furnace or open hearth steel."

Carnegie-Illinois can produce these different forms in any alloy composition, as regular quality steel or to the highest quality requirements — Aircraft Quality, Bearing Quality, Rifle Barrel and Gun Quality, and any other special quality.

These different alloy forms, grades or qualities are produced in most cases in both our Pittsburgh and Chicago mills. So, whether you're located in the East or West, we have the producing and finishing equipment to meet all specification demands and are able to take care of your Alloy Steel requirements, *completely*.

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. . . That Carnegie-Illinois produced almost all of the Hadfield Manganese sheet steel helmet blanks.

. . . Devised methods of annealing that permitted Carnegie-Illinois to produce almost 50% of the hot rolled armor piercing shot steel.

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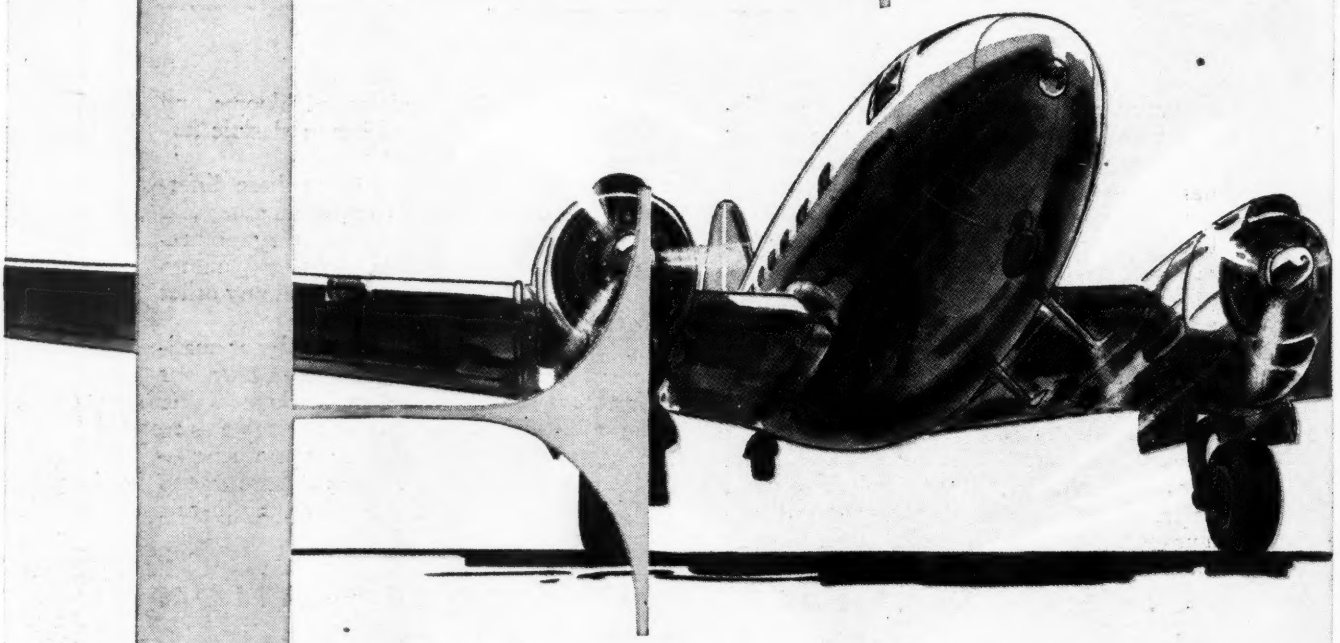

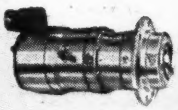

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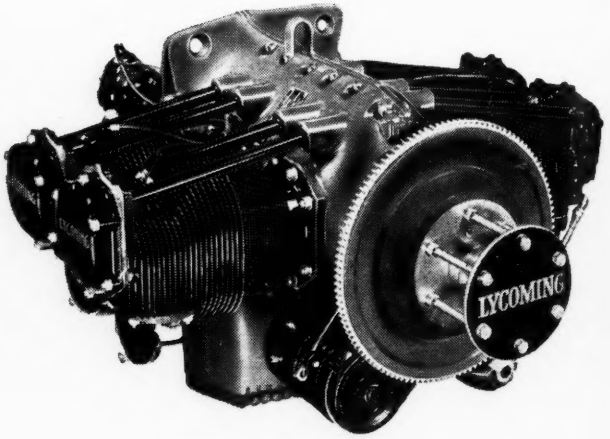

Lycoming Model 0-235-C
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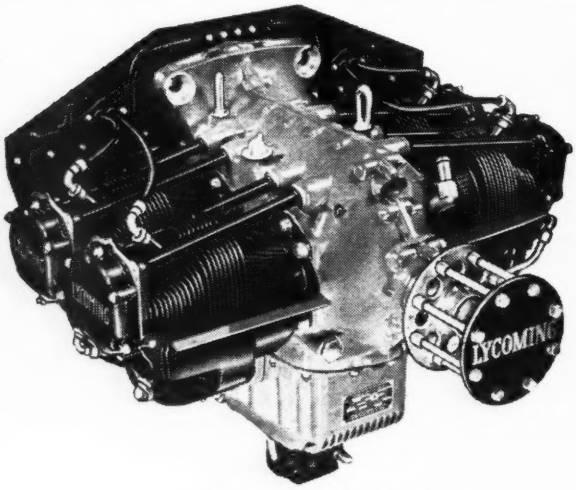
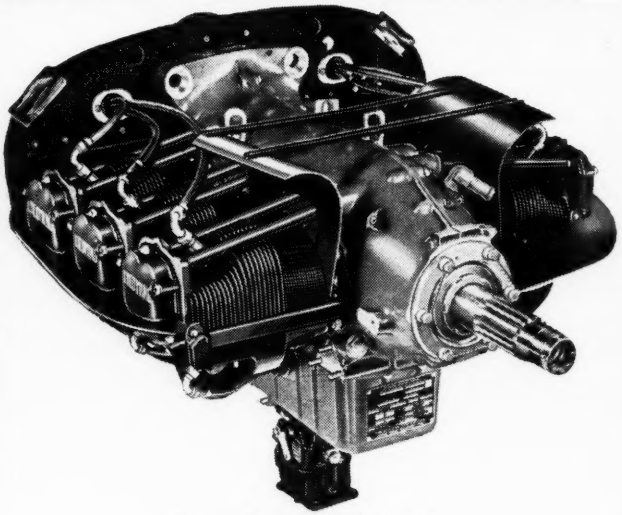


Lycoming Model 0-290-A
Normal rated 125 BHP



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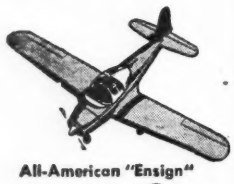
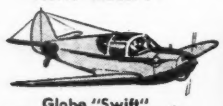


All-American "Ensign"

Beech "Bonanza"

Commonwealth "Skyranger"

Culver "Model V"



Globe "Swift"

Piper "Super-cruiser"

Republic "Seabee"

The enclosure . . .

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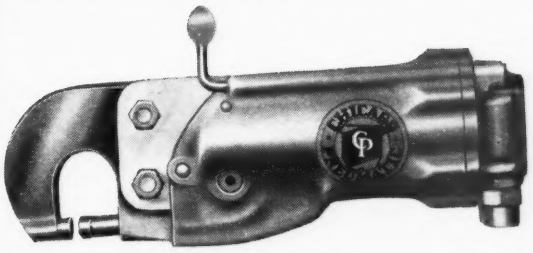

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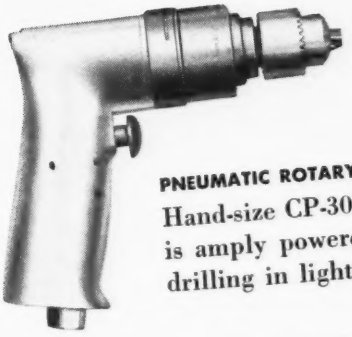

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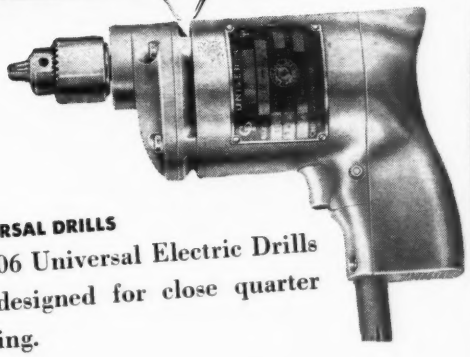

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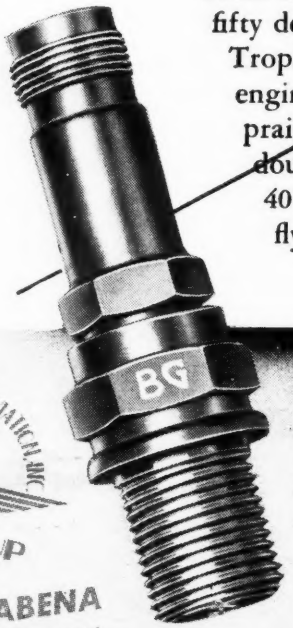

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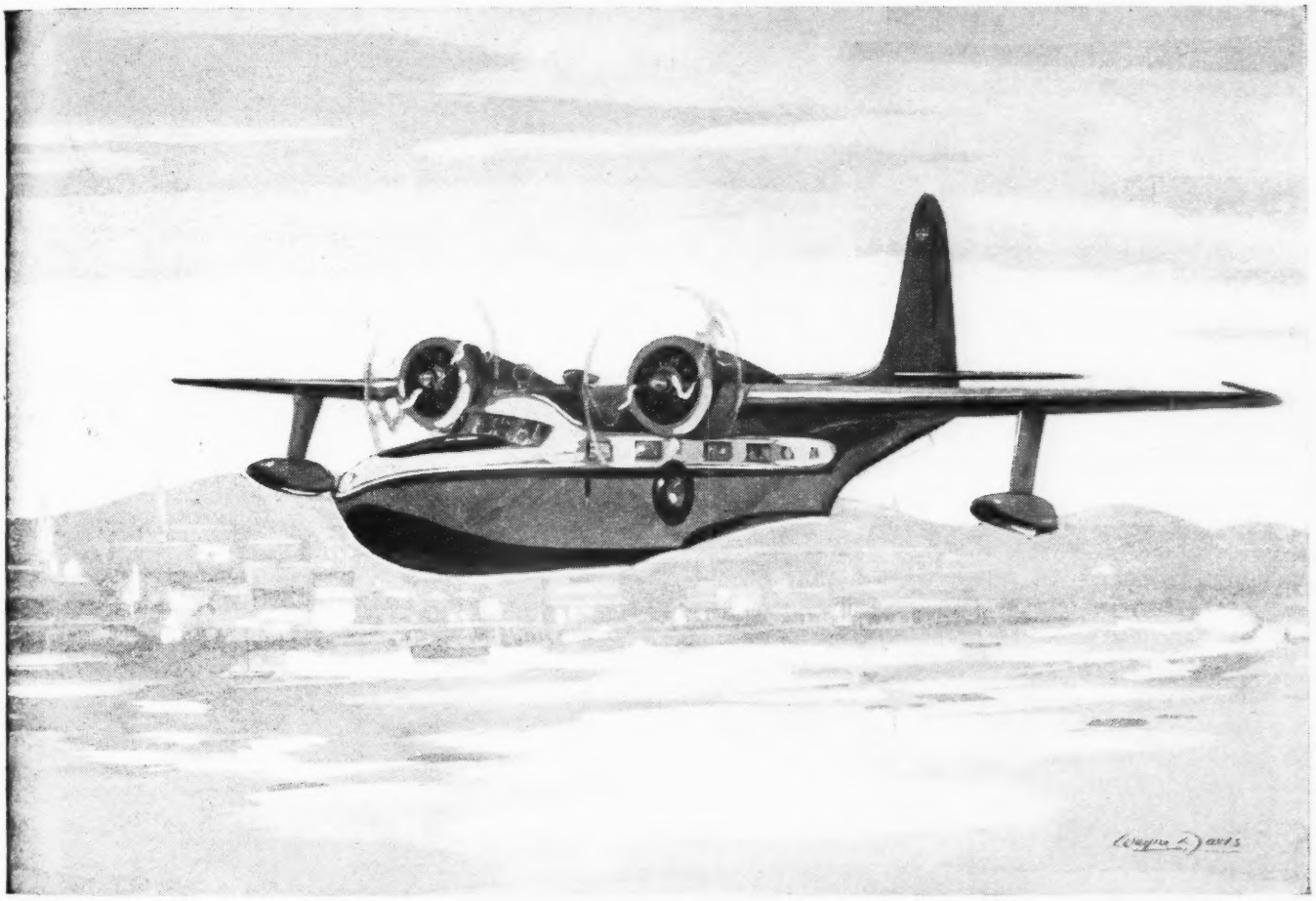

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a. The standard blank using ¾" birch laminations with the glue lines parallel to the chord line.

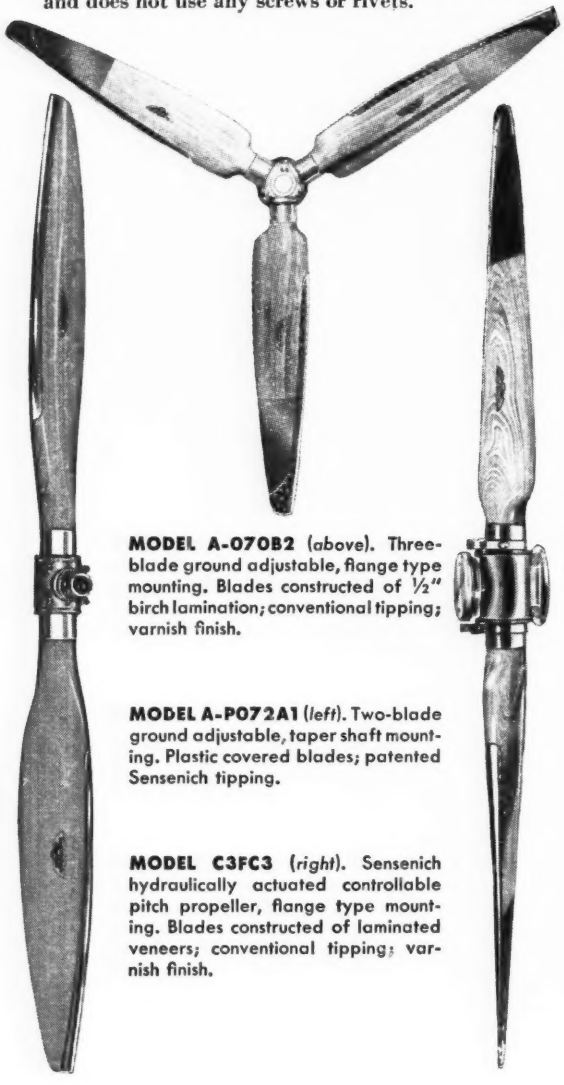
b. The blank using ½" vertical birch laminations with the glue lines at right angles to the chord line.

c. The blank constructed of laminated 1/16" or 1/32" maple or birch veneers with the glue lines parallel to the chord line.

All blades have a steel ferrule pressed on the blade root, retained by lag screw type blade retention screws. Two type finishes are used on blades.

a. A standard spar type propeller varnish with metal tipping secured by screws and rivets.

b. A blade covered with a plastic sheet using either conventional metal tipping or Sensenich patented metal leading edge which is molded into the plastic and does not use any screws or rivets.



MODEL A-070B2 (*above*). Three-blade ground adjustable, flange type mounting. Blades constructed of ½" birch lamination; conventional tipping; varnish finish.

MODEL A-P072A1 (*left*). Two-blade ground adjustable, taper shaft mounting. Plastic covered blades; patented Sensenich tipping.

MODEL C3FC3 (*right*). Sensenich hydraulically actuated controllable pitch propeller, flange type mounting. Blades constructed of laminated veneers; conventional tipping; varnish finish.

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ALL fixed pitch wood type propellers are constructed of aircraft birch or maple laminations bonded together by a moisture proof phenolic resin glue with the glue lines running parallel to the chord line. The leading edges are protected against abrasion by metal leading edge strips and cap tips, fastened to the propeller by steel screws and copper rivets. Approximately 12 inches of each blade tip is also further reinforced and protected by a sturdy fabric or plastic covering glued to the wood.

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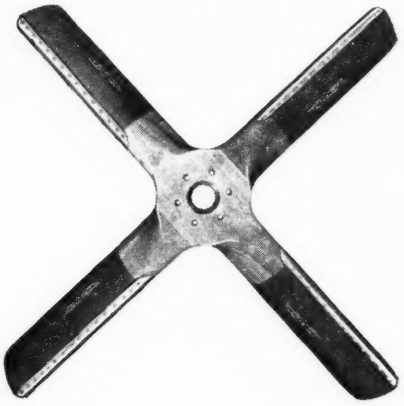
MODEL 72C. Fixed pitch wood type propeller.

MODEL TC4A TEST CLUB Fixed pitch wood type test club with fabric and metal tipping. All test clubs may be purchased either with or without fabric and metal tipping.



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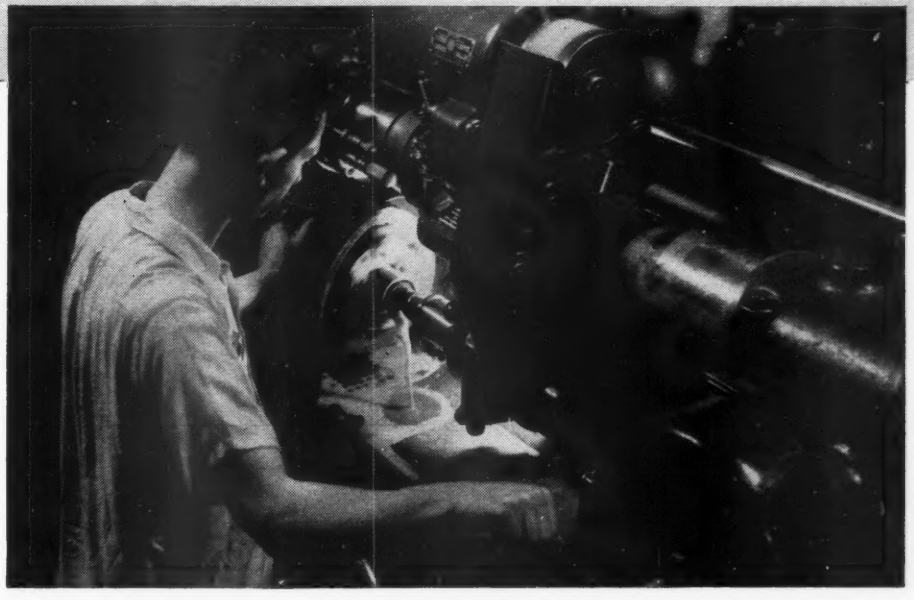

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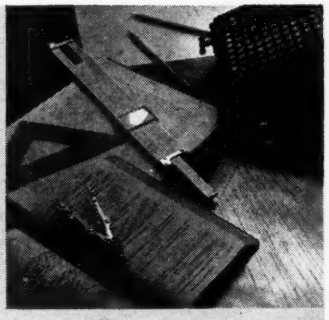
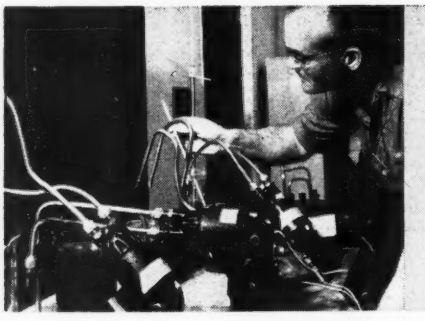


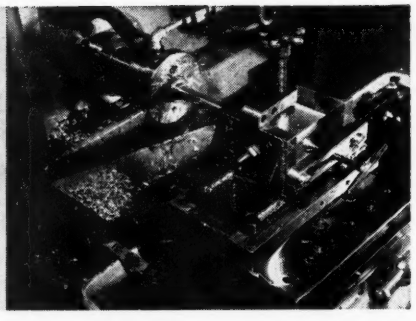
ENGINEERING



EXPERIMENTAL
DEVELOPMENT

PRODUCTION

Scientific Planning
Flawless Materials
Exact Control



ADEL
PRECISION PRODUCTS CORP.

Dept. B VAN OWEN ST., BURBANK, CALIF. • HUNTINGTON, W. VA.

AIRCRAFT PRECISION HYDRAULIC CONTROL EQUIPMENT

FLUID CIRCUIT DIRECTIONAL CONTROL VALVES
•
HAND PUMPS
•
AUTOMATIC AND MANUAL FLUID CONTROL VALVES
•
ACTUATING CYLINDERS
•
REMOTE ELECTRICALLY-ACTUATED VALVES
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FLUID METERING PUMPS
•
ANTI-ICING SYSTEMS
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REMOTE HYDRAULIC CONTROL SYSTEMS
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ELECTRICALLY-POSITIONED HYDRAULIC CONTROL SYSTEMS
•
FLUID INJECTION PUMPS
•
HIGH SPEED PNEUMATIC VALVES
• • •
LANDING GEAR EQUIPMENT
STRUTS
•
SHOCK ABSORBERS
•
STRUT RETRACTION ACTUATORS
•
DOWN LOCKS
•
POWER PACKAGES
•
VIBRATION DAMPENING TUBING SUPPORT CLIPS AND BLOCKS
•

DESIGN SIMPLICITY • QUALITY • DEPENDABILITY

A NEW ADEL PRODUCT . .

. a *TWO-PIECE,* integrally-formed, self-aligning bearing.

The Adel *HALFCO* SPHERICAL-CONTACT BEARING consists of two inseparable parts: a hardened, highly-polished, precision-ground steel ball around which a hard bronze outer race is formed.

Adel HALFCO SPHERICAL-CONTACT BEARINGS surpass in maximum load capacity, and permit greater misalignment of mechanical elements than any other type of self-aligning bearing.

One of countless applications for which Adel HALFCO bearings are eminently suited is their use as self-aligning bearings for mechanical linkage rod ends.

HALFCO SPHERICAL-CONTACT BEARINGS are manufactured by Adel Precision Products Corp., under exclusive license, in accordance with U.S. and foreign patents pending.

ADEL PRECISION PRODUCTS CORP.

BURBANK, CALIFORNIA **HUNTINGTON, W. VA.**

DESIGN SIMPLICITY – QUALITY – DEPENDABILITY

A.T.1.

SAFETY SERVICE IN THE VICKERS VIKING. A test take-off on one engine at full load demonstrates the ample power reserve on the Vickers Viking. This spells safety . . . safety stressed in every item of specification . . . Sperry Auto-pilot, Radar and radio aids . . . night flying and de-icing equipment . . . dual controls, duplicate instruments . . . automatic anti-fire control and many other devices. Safety . . . combined with high cruising speed and economical operation in this medium civil airliner developed out of Vickers-Armstrong's long experience in aircraft design and construction . . . safety proved by British European Airways, users of Vickers Vikings on regular scheduled services.

VICKERS - ARMSTRONG LIMITED • AIRCRAFT SECTION, WEYBRIDGE WORKS, WEYBRIDGE, ENGLAND

Higher Speeds are in the package, too

Stepped-up speeds are an ever-present challenge to a ball bearing's precision life. For here unbalanced forces which may be negligible at low speeds are greatly accentuated unless bearing run-out is held to an absolute minimum.

That's why many careful hours go into the grinding of Federal Ball Bearing races, to produce inner and outer races concentric with each other and to prevent run-out... regardless of the r.p.m. Moreover, the bore is cylindrical, not tapered or bell-mouthed, and the sides of the rings are held parallel to each other and the ball track. Proper operating fit is the end result, and the right running clearances are maintained in the housing and on the shaft.

Federal-manufactured balls are "speed-conditioned," too. All are uniformly spherical within .000025", and do not vary in diameter more than .00005" in any bearing. Selective assembly of balls and race rings preclude any Federal Bearing from being too tight or too loose.

Every fourth operator is an inspector at Federal. They see to it that higher speeds are "wrapped" into every Federal Ball Bearing package along with quiet-running, longer life and extra capacity for the heavier loads.

Bear this in mind *wherever tolerances are tight* and specify Federal Ball Bearings...in any range or size.

THE FEDERAL BEARINGS CO., INC. • POUGHKEEPSIE, NEW YORK

Makers of Fine Ball Bearings

REPRESENTATIVES LOCATED AT

Detroit: 2640 Book Tower—26 • Cleveland: 402 Swetland Building—15
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FEDERAL BALL BEARINGS

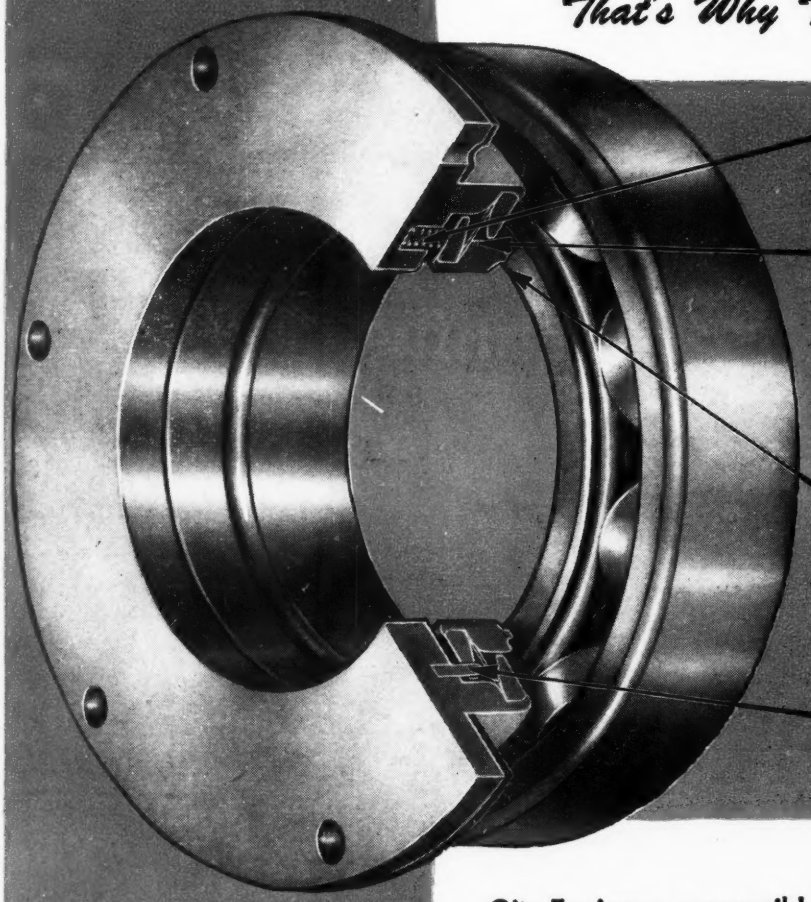
ONE OF AMERICA'S LEADING BALL BEARING MANUFACTURERS

Equal to your most intricate needs

GITS
HIGH SPEED OIL SEALS

—represent over 35 years of specialty engineering

That's Why They Always Satisfy



SPRINGS
give proper, evenly distributed pressure on bronze seal ring.

DIAPHRAGM
made of special oilproof and waterproof fabric, resisting heat up to 220° F. constant and 275° F. intermittent. These seals are made also with a metal diaphragm and are used where temperatures are constant above 220° F.

SEALS HERE
Oil is sealed in the bearing chamber by a bronze ring pressing against a bearing race or a hardened and lapped washer. This surface must be lapped free of all scratches and markings.

GUIDE PINS
eliminate torsional strain on diaphragm.

Gits Engineers responsible for the design and function of this world-accepted high speed seal have worked with it and slept with it until they have perfected its development to the finest degree of oil-sealing efficiency possible. In this tried and proved seal, you have a highly-finished and specially-tensioned bronze contact face that operates on a true-running, very hard steel surface lapped to seal oil within a bearing chamber. *This seal does not contact the periphery of the shaft.* Available in ¼" to 4" shaft diameters—larger on application. Permit us to help you on your next sealing problem. Submit complete data for our recommendations.

For detailed information on this and others of the famous Gits line of lubricating devices, write for Bulletin.

GITS BROS. MFG. CO.
1859 S. Kilbourn Avenue, Chicago 23, Illinois

Exclusive for over 35 years

IS SEAT WEAR-AND-TEAR EATING INTO YOUR PROFITS?

You cannot, of course, avoid heavy, seat-stretching adults . . . or kids who use seats for doormats . . . or even little "eat-and-spill" menaces. But you CAN keep them from causing you unnecessary expense if your seats are covered with that Lumite fabric that *cannot* wear out . . . *cannot* bag or "cup" . . . and *cannot* stain! Lower your maintenance and cleaning costs by specifying Lumite fabric. For still other advantages . . . read below!

Lumite is wearproof · beautiful · luxurious

1.

Unlimited choice of beautiful patterns

The pattern, weave and color-combination possibilities of Lumite are endless! Lumite reflects LUXURY . . . to the eye *and* to the touch . . . yet low cost, plus amazing long-wearing qualities, make it a highly practical investment.

2.

Cannot fade . . . won't stain

Lumite's fresh, bright colors can *never* fade or run. Because it is woven of Dow's Saran, the color is IN the plastic filament itself. *Nothing* can stain it . . . neither dirt, dust, mud, ink, grease, chewing gum, food, lipstick nor any liquids.

3.

Easy to clean . . . at less cost

No scrubbing . . . no vacuuming . . . no complicated cleaning methods! Easy to clean! That means less time and less labor required to maintain seats . . . which reduces your annual cost of upkeep considerably.

4.

Pliable . . . fits snugly . . . ventilated

Lumite fabric "upholsters well"! It cannot ravel, sag or tear. There is no "cupping." It holds a snug fit on the seat . . . *permanently!* Because Lumite "breathes", it never becomes sticky in hot weather nor clammy in cold weather.

WRITE TO OUR DEPT. 52—for free samples and descriptive literature. Our trained engineers will be glad to work with you on your special applications.

LUMITE

woven plastic fabrics

LUMITE DIVISION

CHICOPEE MANUFACTURING CORPORATION

47 WORTH STREET, NEW YORK 13, N. Y.

AiResearch Builds "CABIN COMFORT" For Jet Medium Bombers

COCKPIT PRESSURE REGULATOR
AIR ENTERS PRESSURIZED COCKPIT
COMPRESSED AIR BLED FROM JET ENGINES AT 450° F.
COOLANT AIR
REFRIGERATION UNIT
Composed of expansion turbine and heat exchanger. COOLS AIR TO 35° F.
FLOW CONTROL VALVE
Regulates cabin temperature by controlling air flow through Refrigeration Unit.

One System Provides Complete, Automatic Control of Cockpit Pressure and Temperature

Air friction around the fuselage of a jet medium bomber boosts cockpit temperatures as much as 40-50° F. This heat must be overcome by introduction of cold air — but all air for the pressurized cockpit comes from the jet compressors at 450° F. Result — a tough cooling problem.

Most designers solve this problem with an AiResearch "Cabin Comfort" system, which provides both temperature control and pressurization. Key to "Cabin Comfort's" remarkable cooling efficiency is the revolutionary AiResearch expansion turbine. In the installation pictured above, a 10-pound turbine, operating at 48,000 r.p.m., cools air 135° at 20 pounds airflow per minute!

AiResearch "Cabin Comfort" equipment is being furnished for the newest planes of Douglas, Lockheed, Consolidated Vultee, Boeing, North American, Republic and Northrop.

AiResearch leadership is based on seven years of pioneering research and production. Call upon this unique background to help solve *your* problems in aircraft air control. AiResearch Manufacturing Company, Los Angeles 45, Calif.

AiResearch
DIVISION OF
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Sales Representatives: NEW YORK, AERO ENGINEERING, INC., ROOM 1014, 160 BROADWAY • SEATTLE, C & H SUPPLY CO., 2723 FIRST AVENUE S. • WICHITA, N.S. CHAPIN, 815 EAST GILBERT

Two Sides to the Picture

PRECISION GEAR DIVISION

"A-Q" Gears, engineered and produced in the Precision Gear Division of Foote Bros., offer manufacturers new possibilities in the field of power transmission.

Their application holds the solution to many problems where conditions demand extremely high speeds—where every ounce of excess weight must be eliminated—where utmost efficiency is required.

The Precision Gear Division also has complete research, metallurgical, engineering and manufacturing facilities to produce Power Units and Actuators, which provide control from a remote point, within an exacting time cycle. These units assure accurate mounting, so essential if the full benefit of "A-Q" Gears is to be realized. Originally developed for airplanes, Power Units and Actuators are also applicable on industrial or construction equipment where better control is required.

INDUSTRIAL GEAR DIVISION

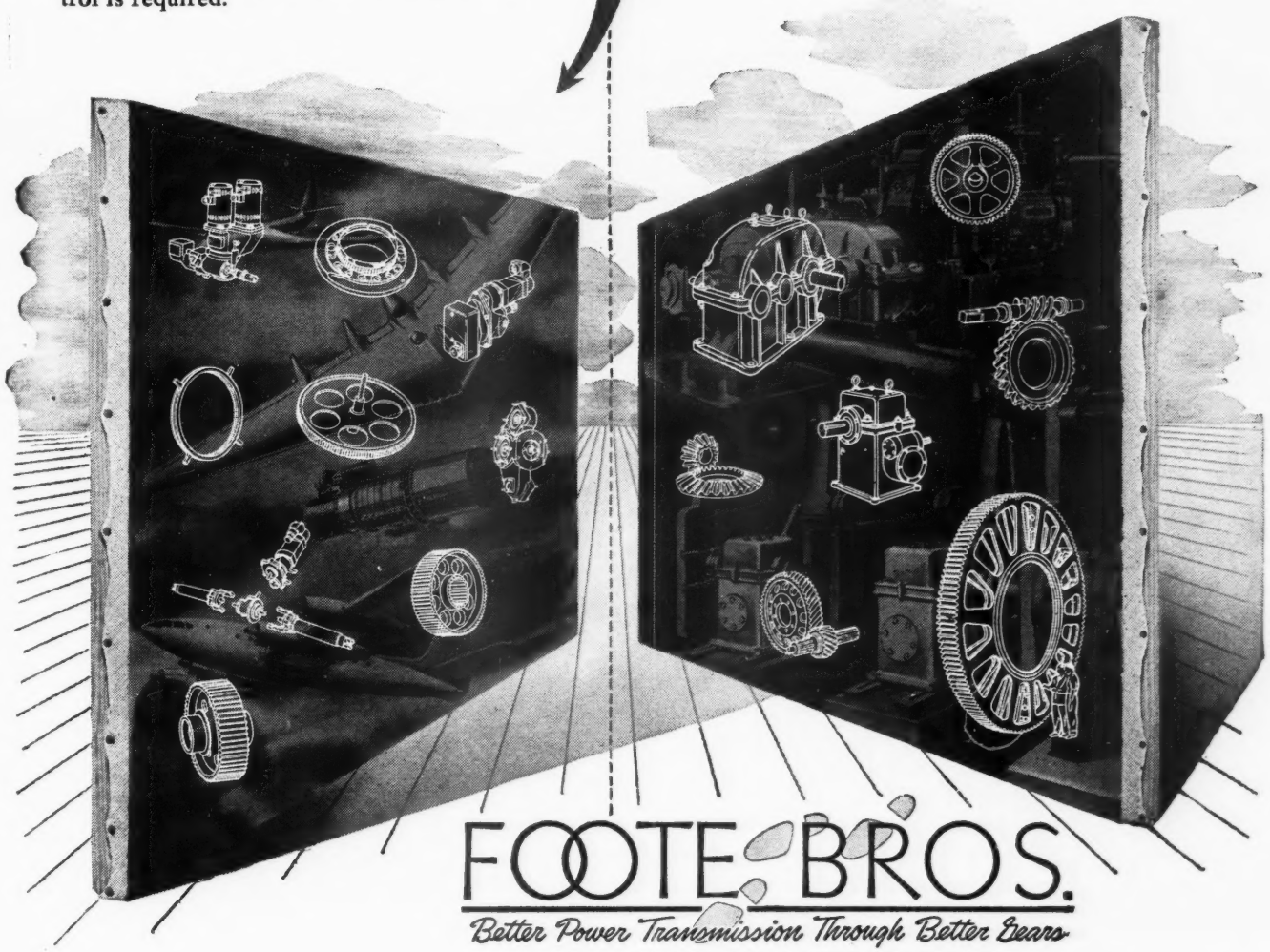
Nearly a century of experience is back of the power transmission equipment produced by the Industrial Gear Division of Foote Bros. This division offers a complete line of worm gear reducers and helical parallel shaft reducers in a wide range of ratios and sizes.

Many manufacturers also look to Foote Bros. to supply their needs for worm, helical, spur and bevel gears, completely manufactured from the original design to the finished gear. Sizes range from 16 D.P. up.

Foote Bros. gear cutting capacities include equipment capable of producing giant gears up to twenty feet in diameter for use on cement kilns and other large applications.

Still another phase of this company's operation is the construction of heavy machinery for locks, dams and bridges as well as special machinery built to specifications.

Regardless of what your requirement in the field of power transmission equipment may be, Foote Bros. will be glad to discuss the problem with you.



FOOTE BROS.

Better Power Transmission Through Better Gears

FOOTE BROS. GEAR AND MACHINE CORPORATION
Dept. G, 4545 So. Western Boulevard • Chicago 9, Ill.

Faster production .... better products

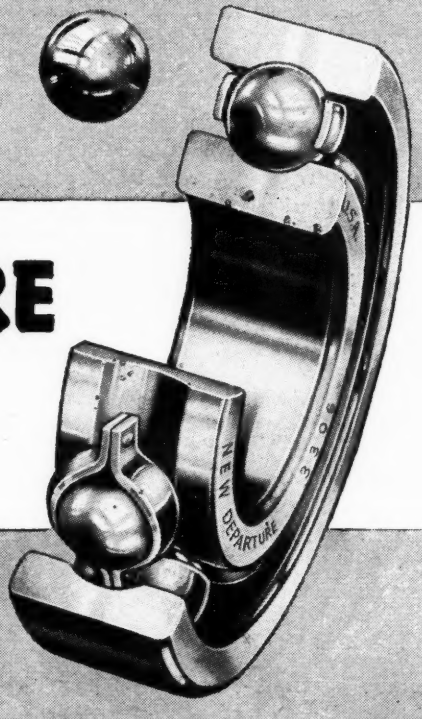
With America and all the world waiting for goods, what can industry do to get faster production?

One practical answer is this — faster machine speeds — more pieces per hour, at lower cost.

That can be done — safely — if the machine is equipped with New Departure ball bearings.

They operate with less friction, less wear, than any other type of bearing. They permit higher speeds, faster production. They hold machine parts precisely in place, under every *kind of load*. They assure unchanging accuracy, and uniformly better products. Write for booklet, "Why Anti-Friction Bearings."

Nothing rolls like a ball....



NEW DEPARTURE
forged steel
BALL BEARINGS

6 VITAL ADVANTAGES

- Higher speeds
- Greater accuracy
- Simplified design
- Lower maintenance costs
- Every kind of load
- Less friction—less wear

NEW DEPARTURE • DIVISION OF GENERAL MOTORS—BRISTOL, CONN. • Branches in DETROIT • CHICAGO • Other principal cities.

Send for the Reynolds Library on Aluminum

. . . for authoritative answers to today's Aluminum problems

What is your answer to these questions on aluminum?

If you work with aluminum or its alloys, some of these problems are familiar to you . . . some you may have to solve in the future.

These are just a few of the hundreds of questions answered in the Reynolds Library of aluminum and aluminum alloys. Prepared by the technical staff of Reynolds Metals Company, these aids are accurate, up-to-the-minute, ready with the right information at the right time.

If you don't have *all* of these aids in your reference file, simply fill out the coupon below, and mail with your check or money order to Reynolds Metals Co., **2536** S. 3rd St., Louisville 1, Ky.

1. QUESTION: What are the two most critical factors in the welding of aluminum?

"Welding Aluminum"—Gives detailed information on the 11 aluminum welding processes from edge preparation to finishing. Fully illustrated with photographs, chart and tables.

ANSWER: Oxidation and apparent weakness of aluminum at high temperatures.

2. QUESTION: When drilling a hole to be machine-reamed in aluminum alloys, how do you figure the proper allowance?

"Machining Aluminum Alloys"—124 pages packed with practical up-to-date facts. Eight double-page charts of easily usable data on tooling, speeds, and feeds, for eight important types of machining operations.

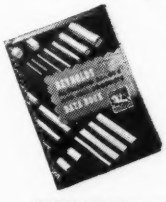
ANSWER: The formula is Drill diameter=0.95 × reamer diameter.

3. QUESTION: What are the three main types of anneals used with aluminum alloys?

"Heat Treating Aluminum Alloys"—The "What, Why, and How" of the metalling and heat treatment of different aluminum alloys and tempers. Complete with tables, photographs and charts.

ANSWER: Horizontal bulk anneal, vertical anneal, flash anneal.

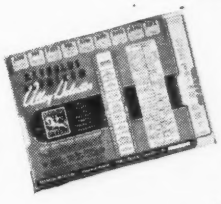
4. QUESTION: How many Reynolds alloys are produced in forging stock?



"Aluminum Alloys and Mill Products Data Book"—Contains 248 pages, 106 tables, 20 photographs . . . of specific facts about aluminum alloys and aluminum mill products. Complete information on ordering to your needs.

ANSWER: Eight—14S, 17S, 18S, 25S, 32S, A51S, R317, R353.

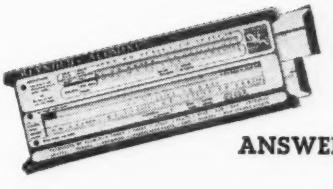
5. QUESTION: How quickly can I find out about the properties of aluminum alloys?



"Alloy Selector"—Just two simple settings give you mechanical properties, chemical composition, physical constants, thermal treatments, and specification number of 18 aluminum alloys.

ANSWER: In 1 minute with Reynolds Alloy Selector.

6. QUESTION: How can I save time in calculating weights?



"Metals Weight Calculator"—Simple . . . accurate . . . fast. Calculates the weights of aluminum, magnesium, steel, brass, copper and nickel in various forms (sheet, rod, etc.). Range—from .0006 lbs. to 3,000 lbs.

ANSWER: Use the Reynolds Weight Calculator.

Reynolds Metals Company 1747-A1-3B
2536 South Third Street, Louisville 1, Kentucky

Please send me:

( ) The complete Reynolds Library on Aluminum — $6.50
( ) "Welding Aluminum" — $1.00
( ) "Machining Aluminum Alloys" — $1.00
( ) "Heat Treating Aluminum Alloys" — $1.00
( ) A Reynolds Data Book—$2.00
( ) A Reynolds Alloy Selector—$1.00
( ) A Reynolds Weight Calculator—$.50

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makes flying more fun

Yes, flying is more fun now that you can enjoy the convenience, speed and safety of electric starting . . . when your generator keeps the battery charged and supplies plenty of current for lights, radio and accessories. Also, Delco-Remy electrical equipment brings you all the efficiency and dependability that have made Delco-Remy such a familiar and favored name wherever wheels turn or propellers spin.

Delco-Remy Division,
General Motors Corporation.

DELCO-REMY—WHEREVER WHEELS TURN OR PROPELLERS SPIN

Design for

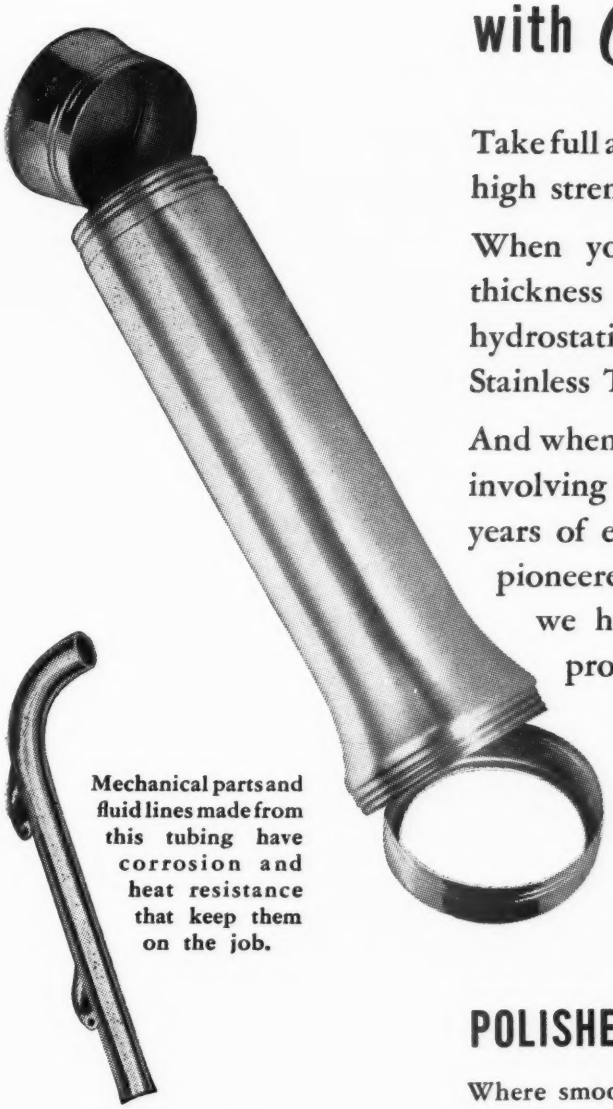
✓ LOWER UNIT COSTS
✓ MAXIMUM SERVICE LIFE

with *Carpenter* stainless tubing!

Take full advantage of the corrosion and heat resistance plus high strength/weight ratio of Carpenter Stainless Tubing.

When you need Stainless Tubing with uniform wall thickness throughout each length—tubing that is 100% hydrostatically tested—be sure your orders specify *Carpenter* Stainless Tubing.

And when you want help with your engineering problems involving Stainless Tubing, make use of Carpenter's 20 years of experience. Ever since the days when Carpenter pioneered the development of Welded Stainless Tubing, we have been putting our know-how to work on problems similar to yours. Drop us a line today.



Mechanical parts and fluid lines made from this tubing have corrosion and heat resistance that keep them on the job.

Consumer goods like this flashlight case can be produced at less cost because of the *uniform walls* of Carpenter Stainless Tubing.

CARPENTER STAINLESS TUBING for

—Strength and Rigidity
—Weight Savings
—Corrosion Resistance
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—Accuracy
—Fabricating Savings
—Longer Service Life
—Sales Appeal

POLISHED INSIDE *Carpenter* Stainless Tubing

Where smooth interior surfaces are mechanically desirable—or where they are required in chemical or food processing—check the ways you can save with Carpenter Polished Inside Stainless Tubing. This tubing is available in a complete range of analyses and sizes.

THE CARPENTER STEEL COMPANY • Welded Alloy Tube Division • Kenilworth, N. J.

Carpenter
STAINLESS TUBING

Save 10 Pounds per Engine

LORD MR-36-J DYNAFOCAL SUSPENSION FOR R-2800-C ENGINES

The MR-36-J Dynafocal Engine Suspension is LORD'S latest contribution to lighter, faster and more economical aircraft design. Each engine suspension is ten pounds lighter than equivalent previous models, with no sacrifice in strength or performance. The MR-36-J provides the same high degree of vibration isolation, contains the same positive safety features, and delivers the same long service life as other LORD Dynafocals. The name LORD upon an engine suspension is your assurance of finest engineering design and precision manufacturing.

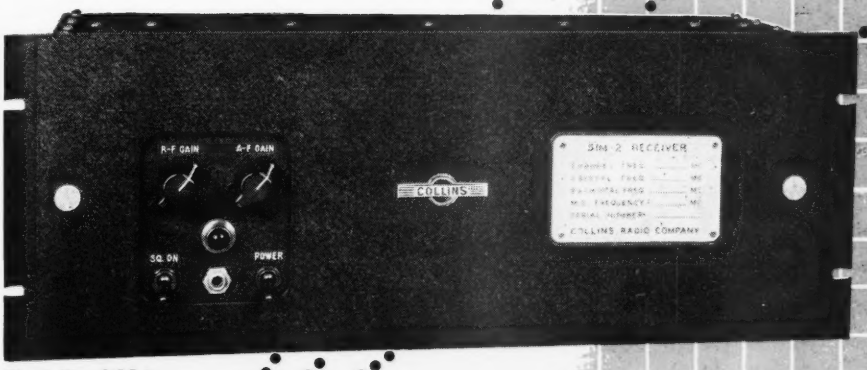
The lightweight MR-36-J Dynafocal Suspension is one of many LORD developments in the field of vibration control. Some have been announced and others are on the way. LORD, pioneer in Vibration Control, maintains leadership by constant research and improvement.

Complete analysis and test data, including stress and frequency calculations, available upon request. Send for your copy today . . . there is no obligation.

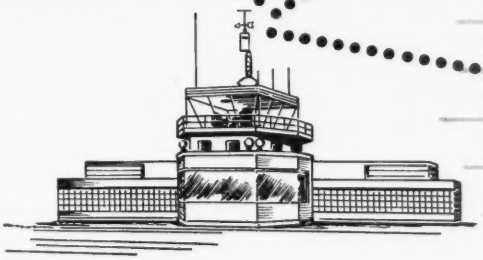
LORD MANUFACTURING COMPANY, ERIE, PA.

FIELD OFFICES { New York, N.Y. Detroit, Mich. Washington, D.C. Chicago, Ill. Burbank, Cal.
Canadian Representative: Railway & Power Engineering Corp., Ltd., Toronto, Canada.

Dependable VHF Radio Reception



The Collins 51M-2
VHF Receiver



for Municipal Towers

Remote Operation

The many inherent advantages of very high frequency radio communication between control towers and aircraft can be realized with Collins equipment. The Collins 51M-2 VHF radio receiver for ground stations provides continuous, reliable reception on any one frequency between 118 megacycles and 136 megacycles. It can be installed in a remote location and left unattended, with all necessary control circuits and audio output connected by telephone line to the operator's position.

Million-to-One AVC Range

A carrier operated audio muting circuit is provided; thus background noises can be greatly reduced during the absence of radio signals. The muting threshold is adjustable. Automatic volume control maintains an essentially constant audio output even though the strength of the r-f input signal varies over a million-to-one ratio.

No Spurious Responses

High sensitivity, signal to noise ratio, and rejection of spurious signals contribute to the superior performance. Use a 51M-2 for each frequency you wish to monitor. You can mount them all in a single cabinet and utilize a single antenna without interaction.

Let us send you an illustrated bulletin giving detailed specifications of this new receiver.

IN RADIO COMMUNICATIONS, IT'S . . . COLLINS

COLLINS RADIO COMPANY, Cedar Rapids, Iowa

11 W. 42nd Street, New York 18, N. Y. **458 South Spring Street, Los Angeles 13, Calif.**

American Stores panel bodies weigh 2100 pounds in Revere magnesium alloy as against 3600 pounds in steel. Built by Barry and Baily Company, Phila., Pa.

Bodies built by Purity Baking Company weigh only 1060 pounds in magnesium alloy compared to 2300 pounds in steel.

HOW FLEET OPERATORS CUT DEADLOAD, INCREASE PAYLOAD, WITH REVERE MAGNESIUM

LIGHT weight truck bodies are no longer something to speculate about . . . they are ready *now* to cut haulage costs for fleet operators everywhere. Proof of this comes from fleet owners themselves, a number of whom have equipped their trucks with panel bodies built of Revere magnesium alloy.

Their experience, in varying types of service, has been that the saving in body weight is so large that it results in substantially greater payload, or in marked savings in operation and maintenance costs. American Stores Company in Philadelphia reports that its bodies of Revere magnesium are 1500 pounds lighter than similar bodies of steel, that each unit can now haul 1500 pounds more payload. The Purity Baking Company of Charleston, W. Va., saves 1240 pounds per body and takes its saving in the form of reduced gasoline consumption, lowered wear and tear on tires and chassis, and smaller maintenance costs. Other operators make similar reports.

This remarkable development was made possible through the design, by Revere engineers, of standard magnesium alloy shapes which enable any body builder to produce bodies of magnesium as easily and quickly as with steel. *Without previous experience in working with magnesium,* several prominent builders have been able to build their first magnesium body at approximately the same cost as that of former steel bodies. The necessary magnesium alloy shapes and sheet are available from Revere stock.

For full details, get in touch with the nearest Revere office. A Revere Technical Advisor will gladly consult with you on this and other applications of magnesium to your business.

REVERE

COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

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Mills: Baltimore, Md.; Chicago, Ill.; Detroit, Mich.; New Bedford, Mass.; Rome, N. Y.

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THE AVIATION NEWS

» **Accident Aspects**—Everyone wanted to get into the act—and did, till the airline accident talk tourney turned hysterical. The accidents were expected, with more flying and winter weather. But the press, ignoring the new high in safety, started the stampede with black headlines on air crashes and nothing on the regular toll of highways and rails.

Air Forces and Navy air arm, forgetting that the airlines taught them to fly schedule, publicized their impressive GCA achievements. CAA and the airlines countered with a demonstration of Sperry's hookup of the gyro pilot to give automatic approaches on the local range ILS. Air Line Pilots and Air Transport Assn. called for independent safety board—with considerable backing in Congress. Senate Interstate & Foreign Commerce Committee moved to ask Congress for $25,000,000 extra for GCA, ILS, and high-intensity approach and runway lights.

Committees in House and Senate started airline safety investigations, where debate gained heat. Sen. Owen Brewster (R., Me.) produced records showing nonscheduled line accidents worse than pictured even by CAB Chairman Landis. ATA sought to deny uncertificated carriers the right to use "-ways" and "-lines" in their advertising.

Because most accidents occur during landing procedures, the tiff centers mainly around GCA and ILS, with unguarded claims for both. Impartial view is that both promise excellent results and should be tried till one is eliminated or both are coordinated in joint use. Many responsible people argue their prejudices instead of seeking safety by whatever means, for both civil and military aviation.

Looks as if CAA and the airlines have lost some credit due for excellent but slow work on ILS by touting it too long, while they might have got up to date with GCA, airborne radar, ground lights, and pilot training. CAA's "no funds" excuse doesn't satisfy the critics; a loud call for military surplus GCA equipment would have turned the trick, funds or no. And airline pilots, when they turn a stiff neck to radar, are inviting young progressive military men to outfly them.

» **Taxes On the Airways?**—If trouble develops character, the airlines will grow strong. While surface transport, and some city governments, are hoping to make them pay more for use of terminal facilities, CAA proposes to assess them for use of the airways. A federal tax of 1½c. a gal. above existing taxes on gas, is contemplated; also a tax of 2% on passenger revenues and 1% on cargo; and a 10% reduction on government traffic. At best these would yield only a third of the $46,000,000 annual cost of airway operation. The plan could not be initiated till the problem of multiple taxation is dealt with.

» **Airfreighters Lose Ground**—Independent airfreight carriers, who last spring were flying several times the volume of schedules lines, are sliding back slowly. In December the certificated lines toted half as much as the fancy-free freighters. Scheduled lines are progressing toward service between all certificated points and, by interchange with surface carriers, between most traffic centers in the U. S. Reorganization of Air Cargo, Inc., the airlines' ground service co-op, will provide pickup and delivery, collection of shipping charges, preparation of shipping documents, etc. But the scheds still face the possibility that CAB will certificate some freight routes.

Time and decline of the air transport boom are playing into hands of the scheduled lines in their battle with the nonscheds. At least a dozen of the latter, cited by CAB last fall for scheduling operations in violation of law, have quit business or revised their practices. Only one, American Air Export & Import, has curtailed services as a result of CAB cease and desist order, but CAB will act concerning others. Some are willing to conform to regulations to avoid formal proceedings. Nonscheds with route applications pending seem anxious to comply, because violation would prejudice their chances of awards. A good long-term guess is that air transport will be re-classified, for purposes of regulation, in terms of passengers and cargo, rather than scheduled and nonscheduled—with allowances for charter and taxi.

» **One for All**—Duplication of airline terminal facilities led to formation of Airlines Terminal Corp., which will handle ticketing, counter service, baggage, express, mail, cargo, communications, dispatching—for all. Braniff and Continental, not waiting for ATC to get going, have started their own joint services in six states. They figure it will save them $50,000 a year.

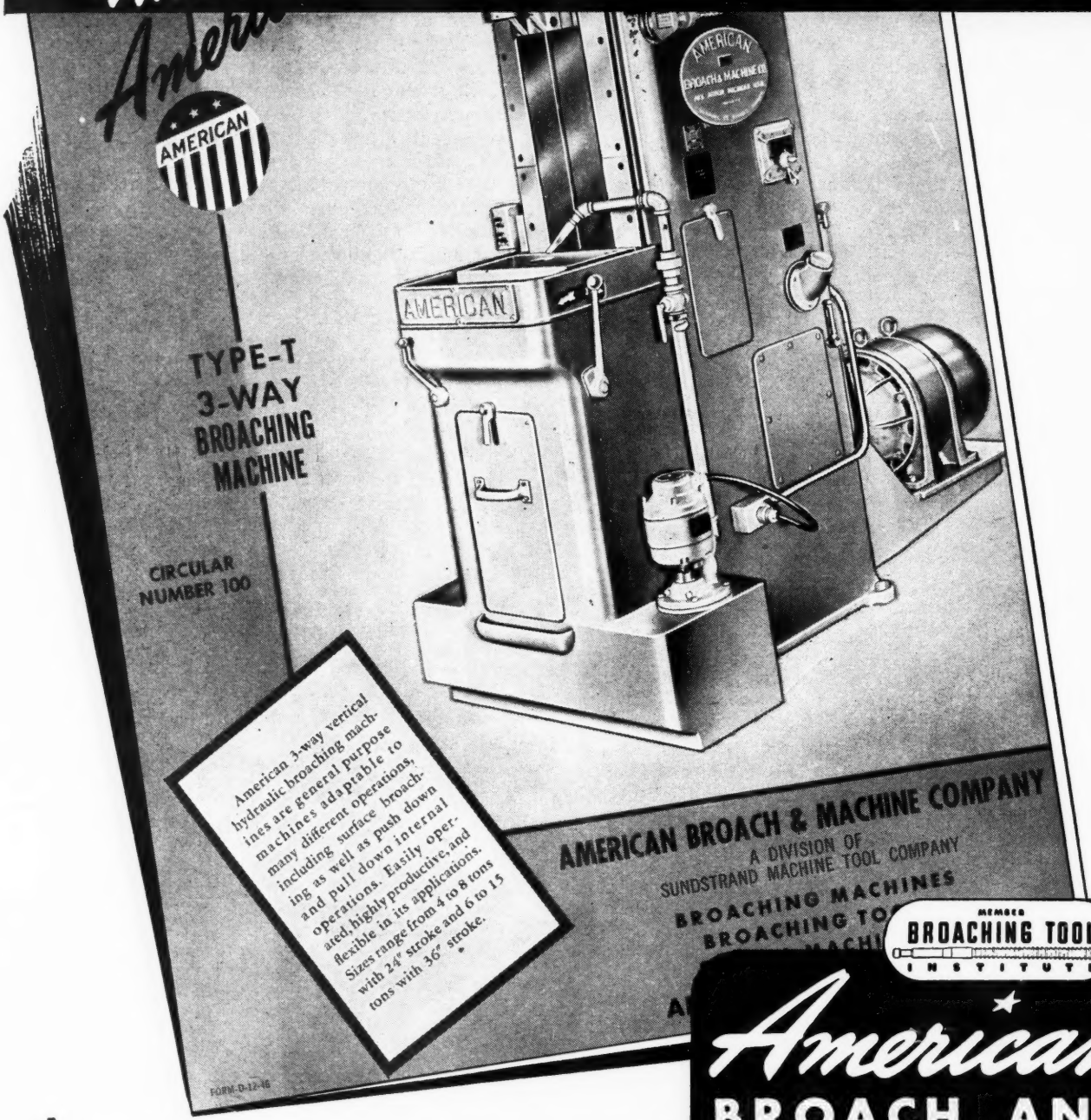
A "good deal," say some global aviation experts is the joint operation being arranged by TWA and Northwest for about May 1. TWA will soon extend from Bombay to Canton and Shanghai. NWA's trans-Pacific runs extend to Anchorage, Alaska, will soon reach Manila and Shanghai. The two lines will coordinate tariffs, schedules, terminal facilities, equipment. As airlines abandon ambitions to circle the globe, there'll be more such hookups.

» **Unification in Quotes**—Army gave in to powerful Navy opposition and agreed to a "unification" plan which leaves the way open for continued internecine battle. Some hold that it accomplishes little more in the way of joint procurement than was already under way. A bill, agreed to by both sides, now before congress, does provide for a co-equal Air Force, which will have its own uniform, prob-

SLAKING THIRST OF BELL XS-1.—Interesting detail is revealed in this candid closeup of Bell's sonic - attempt rocket speedster, seen being refueled at Muroc base. Note how small cockpit is packed with data-gathering apparatus for recording tiny craft's reactions at high velocities. Removal of fuselage cowling (above wing) permits easy access to Reaction Motors rocket engine, also to control cables running down turtleback. At top left is XS-1 fuel cart. (AAF photo)

GET THE FACTS

ON *American's* UNIVERSAL BROACHING MACHINE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ably blue. Beyond that, the bill merely sets up a Secretary of National Defense, with Cabinet rank, under whom secretaries of the three services can go on with their conflicts, even carrying them to the President. But many Congressmen realize what's happened, and they may demand a real reorganization of U. S. military power.

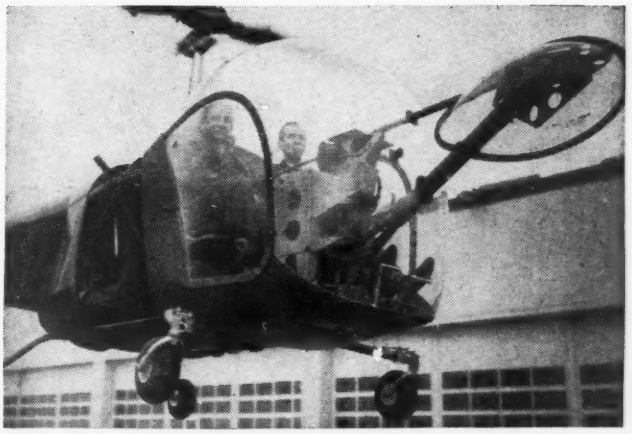
» The Lightplane Picture—Shipments of 14 leading lightplane builders totaled 31,500, valued at $88,000,000 in 1946, Aircraft Industries Assn. reported. December shipments totaled 1,891, against 2,995 in November, a decrease of 31%, two companies not reporting. Backlog of orders Nov. 30 was 31,461, valued at $1,147,664,569, a decline of 23% in numbers from 40,662 in October. Trend is away from 2-place to 3- and 4-place machines. The lightplane industry cannot be viewed darkly unless and until deliveries drop to near the prewar level. So far, the long pull is all right. But hope for a real volume industry is out until personal planes have improved utility.

A proclamation by the President lifts the ban on unlicensed export of lightplanes. Still restricted, however, is foreign sale of machines in excess of 35,000 lb., enabling Army and Navy to prevent heavy planes, convertible to military service, from going to foreign lands. Of course, the Munitions Control Board (War, Navy, Commerce, and State Departments) can license sales to friendly governments.

» Congressional Billing—Aviation bills fell over the new Republican Congress like paper on a Broadway parade. Here's what would happen if they all passed, which they won't: Multiple taxation of air carriers would be stopped. A nine-member air policy board, like the Morrow Board, would be set up. A system of air markers would be spread over the nation. Steamship lines could go into air transport business. A $12,000,000 air academy would be created at Annapolis. You'd send parcel post by air, and buy airmail postal cards. Air taxis (carrying less than ten passengers) would be exempt from transportation tax. Those are the new ones; a dozen or 20 old ones are still there.

» Shush!—Grover Loening, well-known aeronautical engineer, advised citizens of Palm Beach, Fla., to complain to Boeing, Douglas, and Lockheed about the noise their planes make. Municipalities the country over are blocking construction of close-in airports, ordering planes to stay higher than CAA minimums, calling for grounding of particularly rackety lightplane models. There's a lot of loud talk about quiet engines and propellers, but not much action.

» Canadian Notes—Startling to Canadian aviation industry was government's sale of wartime-built Canadair Limited, Montreal, to Electric Boat Co. of New York, with 15-yr. lease-option on physical assets. This is second big government aircraft plant to be sold to private industry, other being Victory Aircraft, Toronto, sold on 50-50 basis to Hawker-Siddeley interests in England. Half of directors in new company operating Canadair are Canadians, and president is H. Oliver West, formerly with Boeing at Seattle. Under Douglas lease agreement, company makes DC-4M's for TCA, RCAF, and for export.



BELL 'COPTER MOUNTS MINERAL "SNIFTER"

Sporting a plastic teardrop ahead of cabin for carrying magnetometer equipment, a Bell Model 47 takes off on a pre-delivery hop carrying Hans T. Lundberg (left) v.-p. of Lundberg-Ryan Air Explorations, Inc., which has bought two Bells to speed search of mineral deposits in U.S., Canada, Mexico, and Venzuela this year. Mr. Lundberg's son, who has checked out in rotary wing craft at Bell's school, will do piloting on expeditions.

WORLDATA

GENERAL REVIEW—170 scheduled common carrier airlines now have network totaling over 650,000 unduplicated route-miles, and offer better than one round trip per day, covering 12 million plane-miles per week. This is not counting data on USSR, which has never released accurate information on its air services, but is known to have 90,000 mi. Most noticeable during past 6 mo. was increase of foreign routes: Route mileage went up 38% compared with 25% for U. S. flag carriers, and scheduled mileage 46% as against our 34%. BOAC had largest net—over 68,000 mi.—while American lines operated highest frequency, better than 11 round-trips per day over its entire system.

ENGLAND—British manufacturers have orders on hand for 1,830 aircraft, 880 of which are for export. Included are 115 Airspeed Consuls, 70 Bristol Wayfarers, 255 DH Doves, 147 Percival Proctors, 56 Tudor II's, and 160 Vickers Vikings....Insistence of government forced BOAC to ease up on its cancellation of Tudor I orders. However, further flight tests show directional instability of Tudor I at takeoff and landing, as well as tail flutter at certain speeds, also high fuel consumption. So complete cancellation is therefore again rumored....Recently disclosed Metrovick F-3 jet engine with thrust augmentation is claimed to have lowest specific fuel consumption—.65 lb./thrust lb./hr. Unit provides 6,000 lb. thrust, weighs 2,500 lb., and has overall length of 15 ft.

CHINA—Shanghai's Lungwha airport is being completely rebuilt to provide at least one 6,000-ft. runway for the coming international operations by TWA and Northwest. New taxiways, hangars, and administration building are also on program, which will entail $20 million expenditure.

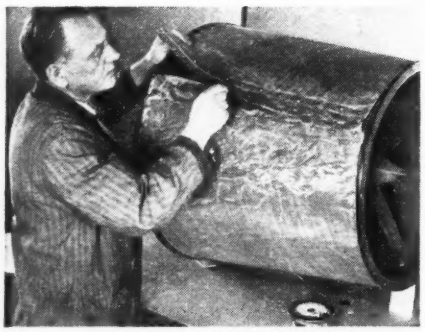
AUSTRALIA—Trend of Australian airlines to purchase U. S. aircraft is continuing, despite stringent British efforts. Trans Australia recently ordered five Convair 240s, and Qantas ordered Constellations, marking first time in this company's history that U. S. craft will be used. Both ANA and TAA are using DC-4s and DC-3s, while latter also form backbone of Guinea Airways, Ansett, and Butler Airways. DH Doves are expected to replace DH Rapides, but indications are that the larger and faster craft will be American, especially following bad results with Yorks and Lancastrians, and poor test showing of Tudor.

SOUTH AFRICA—For use on its internal routes, SAA has placed orders for eight Vikings. These will replace DC-4s. Meanwhile, so-called emergency DC-4 operation to England has been granted another extension, continuing these flights until July.

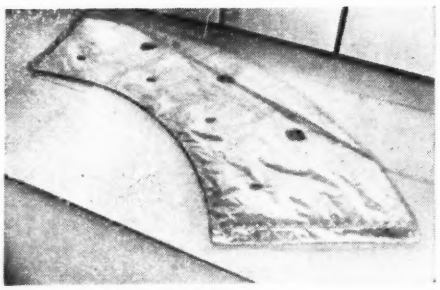
ARGENTINA—Government has placed orders in U. S. for 15 Sikorsky helicopters, to be delivered late in 1947. Craft will be used for newly formed air-sea rescue units of Argentine Navy.

MEXICO—LAMSA, United Air Lines' subsidiary, announced ambitious plans for 1947, including installation of complete radio beam service along its major routes, flood lighting of four main airports, and new construction work. New program calls for additional UAL investment of $2 million for existing routes alone. Company plans to be using Martin 3-O-3s on main routes in '48.

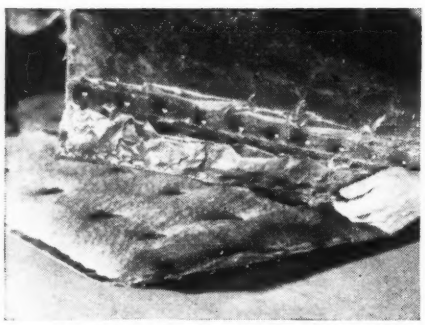
HARNESSES HEAT in the WORLD'S FASTEST ENGINES..



EASY TO APPLY: The J-M Thermoflex Insulation Blanket laces on quickly. Here it is being applied to an engine cone.



CUTOUTS PROVIDED as needed for engine supports, thermocouples and other engine controls.



COMPLETE BLANKET consists of crimped Inconel mesh, amosite fibre, aluminum foil, aluminum screen and Monel screen ends.

J-M Thermoflex Insulation Blanket

THIS NEW BLANKET INSULATION was designed especially for insulating the turbine casings, engine cones and tail pipes of jet-propelled aircraft. It does a two-way job of controlling heat:

1. **It improves thermal efficiency**
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The complete Thermoflex blanket... illustrated at the left . . . consists of these four parts: (1) An Inconel knitted mesh, (2) An amosite asbestos fibre mat usually ½" to ¾" thick, (3) An aluminum foil sheet to serve as a protective diaphragm for sealing the blanket from gas or oil penetration, (4) An aluminum screen cloth with Monel screen cloth ends provided with hooks for securely lacing the blanket in place.

This construction gives the J-M Thermoflex Insulation Blanket many important advantages. It is flexible . . . easily applied . . . lightweight . . . has low conductivity . . . is highly heat-resistant . . . and can be supplied with cutouts when required.

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Insulations • Asbestos Textiles • Transite Conduit
Transite Pipe • Industrial Building Materials

What *should* be the progress . . . what *will* be the progress . . . of our industry in this second postwar year? Here, 16 prominent leaders—heading foremost firms making military, commercial, and personal aircraft, engines, and instruments—give a broadly encouraging, yet necessarily sober

OUTLOOK FOR '47

Harry Woodhead, Pres., Consolidated Vultee Aircraft Corp.—It is plainly evident that air power is this nation's best guarantee of peace in the years to come. We should not again allow the question of our strength or weakness in the air to become a matter for settlement by combat.

To remove any doubt of our ability to defend ourselves in the air does not require that we build and maintain thousands and thousands of airplanes at great expense, but it does require that we match an adequate research program with enough production of our best newly developed planes to do three things: 1. Maintain an operational force adequate to meet any unexpected attack; 2. provide for the training of an adequate reserve force of air and ground crews; and 3. give the aircraft companies adequate minimum orders for particular models to permit the development of the basic tools and jigs that will be needed if an emergency demands a quick expansion of production.

Walter H. Beech, Pres., Beech Aircraft Corp.—First, I must disclaim any ability as a prophet. And it should be clearly understood that I express merely personal opinion in the following: It now appears that quite a few new and improved planes will be available to the public and airlines during 1947. The greatly increased utility of these planes over the utility of the prewar-type models insures a good market for these aircraft.

The market for small two-place personal planes already has become very selective. This is partly due to seasonal conditions and partly due to a decided buyers' preference for certain types. The companies with the most advanced designs are selling such planes as fast as they can make them, whereas other companies are finding difficulties in operating with greatly reduced schedules.

After delays due to strikes and other dislocations, postwar four-place planes for business purposes are just coming on the market. These are very superior in utility to anything previously offered. They are expected to make significant changes in the operations of many businesses, and I believe that the market for them is virtually untouched. They particularly will appeal to the businessmen in the small communities who, to date, have been bypassed by all first class transportation. The low operating cost and high operating speed of such planes place at the disposal of businessmen everywhere first class transportation at a cost easily afforded.

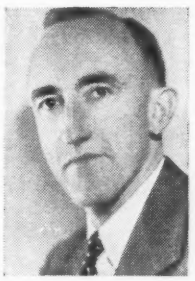
The new airline transport types will operate at lower cost per passenger-seat-mile and offer better schedules. They probably will not be built in sufficient quantities to replace the majority of transports now operating, but they will constitute an important market potential for the aircraft manufacturers. As for new military types, many are in design, testing, and prototype stages, and some will emerge in production quantities in '47. Cutbacks in military budgets have reduced some of the planned orders, but I feel it possible that some of these cutbacks will be reconsidered during the year.

Speaking for Beechcraft, our new four-place Bonanza will enter volume production early in '47, with a backlog of 1,500 planes now on order. Production will continue on the Model 18 executive transport, and our prototype 20-place short-haul transport should be flying before the first quarter of '47 ends. At present we have a backlog of business approximating 30 million dollars.

Guy W. Vaughan, Pres., Curtiss-Wright Corp.—There are no short-cuts to aeronautical progress. The startling accomplishments the public reads about today are the fruit of years of research and development, just as has been every major aircraft development.

We are intensively exploring the fields of rocket propulsion, pilotless aircraft, and guided missiles, but this does not mean we believe the products now in production, particularly for commercial transport, are obsolete or likely to become so very quickly. Every bit of progress on the road to supersonic achievement will come at the price of time, effort, and the wherewithal to accomplish the objectives.

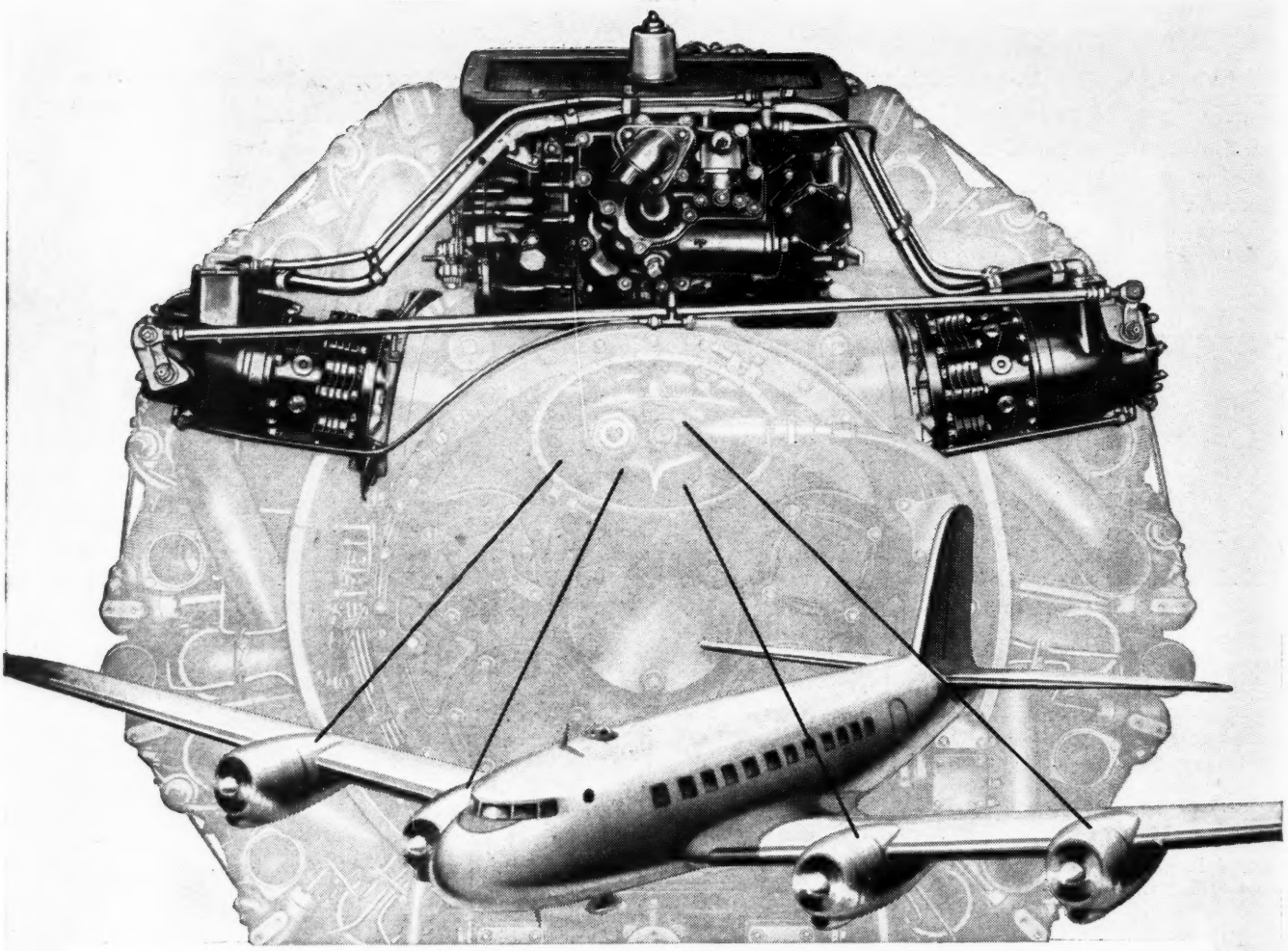
At no time has the aircraft industry faced such challenging technological problems or more urgently required more whole-hearted cooperation of the Government in the advancement of air power and national security. This need must be met by Government adoption of a sound air policy and provision for adequate funds for the carrying out of same.



William M. Allen, Pres., Boeing Airplane Co.—Air Transportation, despite a temporary slackening of its recent unusual growth, will continue to expand. We all agree that the airlines are not functioning as smoothly as they were before the war, but that is true with most industries. The airlines are handling a much greater volume of business than ever before, and have been confronted with many problems—some of which have defied immediate solution. Give them a little time and they will surely correct the situation.

The full meaning of air transportation, both for the moving of people and goods, is just now being realized. It is evident that the airplane will play an increasingly prominent role in world commerce and in achieving world unity.

This country appears to be approaching the end of the



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Engines start more quickly, with less backfiring and shorter warm-ups. Each cylinder receives the precise fuel charge, and there is no manifold condensation. Intake passages carry air only, greatly reducing fire hazards. Since the fuel is vaporized within the cylinder there is no "refrigeration" of intake manifold or carburetor, and consequently no icing from fuel vaporization. Fuel distribution is exactly equalized between cylinders, permitting leaner mixtures and major savings in fuel. Precision-controlled fuel distribution also means smoother operation, longer engine life, and less noise and vibration to annoy passengers. Altitude performance is improved, with more engine power and better acceleration. Engine stalls or faltering due to fuel feed failure are eliminated because fuel feed is unaffected by gravity or inertia effects in climbs, banks or dives.

Performance records, as shown below, make it clear that this Bendix development is one of the most important aviation advancements in years.

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. . . Estimates of fuel savings reach 6 per cent—increased payload of 900 pounds!

. . . Increased cruising speed of 20 M.P.H. . . . Less vibration and noise.

. . . Smoother engine operation, lowered engine maintenance costs!

. . . More engine power and acceleration, and improved altitude performance!

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inflationary spiral, but a tightening-of-belts period should be encouraged rather than discouraged. It is high time for all of us to get back to realities, to recognize that true prosperity can be achieved only through hard work. We must either bring a halt to the increase in the cost of American products or give way to foreign competition. It is apparent that the great increase in product cost will put American industry at a disadvantage. At the same time, we must not reduce the quality of our products.

Boeing enters the new year with a backlog of nearly 200 million dollars in commercial and military orders. Our first postwar Stratofreighter has just been rolled out for the AAF, and before the end of the new year, fleets of its sister ship, the Stratocruiser, will be flying the major routes. Orders for the Stratocruiser have increased to more than 75 million dollars.

The company continues to share a large responsibility for AAF research, development, and production. In addition to 10 C-97 Stratofreighters, we have orders for 133 B-50 bombers, first of which will be produced early in the new year. This plane is designed to exceed the B-29 in load, range, and speed as a key plane in the AAF's postwar national defense program. AAF has also given us two other important assignments for the future—a multi-jet bomber, the XB-47, and a defensive, guided missile called Gapa (ground-to-air pilotless aircraft). Moreover, the company is experimenting with new types of power plants.

Donald W. Douglas, Pres., Douglas Aircraft Co.—I have implicit faith in the future of aviation. The minor difficulties, due to world-wide expansion of air travel, are being solved and eliminated. Basically, people everywhere have faith in aviation. Universal support and confidence will grow stronger as service and performance improve.

Here at Douglas, we feel we can best serve the interests of aviation by supplying the airlines with aircraft having the highest standards of performance, efficiency, and economy of operation. Great strides have been taken in new procedures, navigation facilities, better airports, and airline service.

True progress in aviation must be based upon sound, steady, and constructive accomplishment. I feel that a realistic and intelligent approach to problems and achievements is necessary today, to make a strong aircraft industry a national asset in peace as it was in war.

J. Carlton Ward, Jr., Pres., Fairchild Engine & Airplane Corp.—New national legislation with respect to labor and appropriations will determine in large measure the industrial outlook for '47. If America is to be an important architect of international relations, it must be able to speak with power. And in this day *national* power is *air* power.

The important key to the outlook for the aviation manufacturing industry rests in Army and Navy appropriations yet to be determined by the new Congress. . . . Aviation's commercial transport industry faces an immediate period of adjustment and assimilation. Prospects of increased volumes of airfreight and of airmail are bright spots in the transportation field. . . . Successes in the field of private aircraft are dependent wholly upon increased utility of advanced designs and sufficient volume to permit lower unit cost. Today, factors of volume-and-cost stability prevent optimistic predictions.

Aviation has had a short past but looks to a long future. Its long range picture is bright, and the industry should not be sold short. (Tommy Weber photo)

E. B. Newill, Gen. Mgr., Allison Div., General Motors Corp.—With military airplanes the world over rendered obsolete by recent developments in aircraft power plants, the U. S. is confronted with the immediate urgent need for an intensive development program embracing the whole field of aircraft power design. Turbojet and turboprop engines have opened vast new horizons for the aircraft designer. But not until there has been a great deal more experience in turbine engines will it be possible to ignore the unexplored possibilities of the tried and proved reciprocating engine.

Accumulation of experience in the aircraft industry is an expensive and time-consuming necessity in the national interest. In 1946 the military services were most wise in their initiation of long-range development programs. The national security of our country requires that these programs be maintained in 1947 and continued into the pilot production stages where manufacturing and tactical experience, as well as development experience, can be obtained.

L. H. P. Klotz, Pres., Luscombe Airplane Corp.—From a survey made by our company's nationwide and foreign sales organization, it appears that the sales of personal planes—which will be mainly to business organizations, farmers, ranchers, flying clubs, flight training schools, and those who fly for pleasure and sport—will again be large in '47.

However, it is now generally realized by leading personal plane manufacturers that real sales effort is necessary. By the exertion of such effort, and with the steady improvement in our planes made possible by continuous research, with the construction of many new airports under the national airport program, and with the many thousands who are becoming pilots under the G.I. Bill of Rights, we see little reason why our firm should not sell more Silvaires than we did last year.

We look at 1947 in an optimistic light, believing that the only factor which would cause a revision of this viewpoint is a change in basic business conditions.

Glenn L. Martin, Pres., Glenn L. Martin Co.—Aviation, aided by extensive research in flight safety and speed, has entered 1947 with bright prospects for continued growth and prosperity. The year may well be the most significant period in the industry's history.

Great strides will be made in commercial aviation this year, and the present extremely difficult interim period should be successfully concluded. New postwar transports, such as our twin-engined Martin 2-O-2, will go into service on major airlines. Also, steady progress will be made on meeting such problems as the lack of proper airports to handle ever-increasing traffic, the development of ground and airborne aids to all-weather opera-

tions, and the improvement of operating economy in commercial aircraft.

Indicative of aviation's present position is the volume of work being done here at Martin. We currently are working on a backlog of $210,000,000 in orders for military and commercial planes. Many of our projects involve highly advanced research activity and our engineering employment total is at an all-time high.

Continued sound operating conditions in the industry will remain dependent, to a considerable degree, on maintenance of a substantial procurement and new aircraft development program by the military services. Research and technological progress obtained through Government contracts will continue to benefit all branches of aviation, including commercial air transport.

J. H. Kindelberger, Pres., North American Aviation—The year 1947 should see a continued emphasis on research and development activities. The exceptionally rapid developments in propulsion and other phases of aeronautical science in the past few years have placed an unusually high premium on technical competence and aggressiveness. Although the United States now enjoys a dominant position in air power, it is evident that in a rapidly advancing science such as present day aeronautics this advantage can be lost quickly and never regained. It is imperative that we maintain an aggressive research program.

There is every reason to believe that there will be increased numbers of personal airplanes in use during 1947, with the greatest demand for the plane which can provide the most utility, adequate performance and comforts for the pilot who desires air transportation for both business and pleasure.

William T. Piper, Sr., Pres., Piper Aircraft Corp.—I believe the personal plane industry as a whole will see continued adjustments in the buyers' market trend, but as far as our company is concerned the year promises to be the busiest in our history.

We now have the highest number of employees in our history—3,000. The Lock Haven plant is working two shifts in full production of Super Cruisers, while the Ponca City plant is devoted to turning out Cub Specials. Present backlog of Super Cruisers is about 7,000, and daily production of this craft averages more than 30 planes. Ponca City production meanwhile exceeds 12 planes per day.

LaMotte T. Cohu, Chairman of Board, Northrop Aircraft—The aviation industry today faces many survival problems. But whether the industry survives is of vastly more importance to the citizens of this nation than to the industry itself.

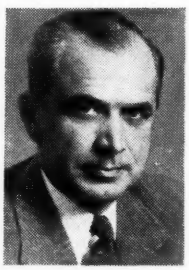
It is more than probable that if the United States had had an adequate modern air force and a strong aircraft manufacturing industry to back it up, World War II would never have occurred. Hitler underestimated the time it would take America's aircraft industry to get into production and, as a consequence, he lost. But this mistake of underestimation will not be made again.

A healthy, active aircraft industry is the surest and cheapest peace insurance in the world today. Absolutely essential to the peace and progress of this country, and the world at large, is an intelligent aviation program which embraces these basic requirements: 1. A sound, workable, national aviation policy; 2. a strong military and commercial air force; 3. properly-trained men to fly and service these airplanes; 4. a healthy aircraft manufacturing industry; 5. a production nucleus always ready to make possible the building of the best available aircraft, in the required numbers, in the shortest time; and 6. a continuing research and development program which will give the United States the best aircraft and aeronautical technical knowledge of all kinds.

Mundy I. Peale, Pres., Republic Aviation Corp.—It was, perhaps, to be expected that the number of aircraft delivered to the Army and Navy air arms during '46 would be very low. The transition from war to peace necessarily resulted in manufacturing delays as well as adjustments in carrying out military planning. But we must not let this lull us into believing that in this year 1947, or in any future year, this nation can meet its requirements for national defense and world security at its 1946 rate of research, development, or production.

Push-button air power may be the coming thing—but it is coming at a relatively slow pace; it is not here now and won't be for a long time. It is the responsibility of science and industry and the military to take what we have and work to bring constant improvement. In commercial and private fields, similar conditions prevail.

Aviation belongs to all the people and not to a favored few. If it is to be made available for the people, from the standpoints of comfort, economy, and security, 1947 is the year to concentrate on sound national policy, balanced with improved development, production, and use. If these aims are achieved, the outlook for the future will, we believe, be basically strong.



T. Claude Ryan, Pres., Ryan Aeronautical Co.—The development of aircraft and aeronautical equipment of the most advanced scientific design stands, I believe, as the most vitally important responsibility of the industry for 1947. This must include applied research, design, experimental construction, and manufacturing in at least sufficient volume for adequate service testing.

The only way this can be accomplished is through contracts for the development and manufacture of such products, an intelligently administered policy by the Government departments concerned, and the providing of essential funds by Congress. The defining and establishment of an overall aviation policy for our nation, and the creation of a National Air Policy Board, would do much to assure the soundest achievement for our country.

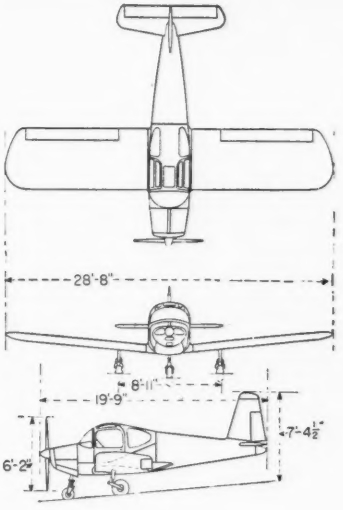
Commercial and personal aircraft development and production will, of course, also be important and should be more stable and prosperous during '47.

Non-aeronautical products will not, I believe, represent

(*Turn to page* 129)

AVIATION'S 1947 Yearbook

This, our 14th annual compilation of engineering data on the world's aircraft, is by far the most extensive we have had the pleasure of publishing. With 315 engineering drawings and photographs, the following section portrays 116 American and 89 foreign airplanes and helicopters. These include personal, executive, transport, military and research categories of the U. S. and eleven foreign countries. Together with AVIATION's oft-imitated but never equalled specification tables, this issue presents data on 240 aircraft and helicopters, in addition to tables on 53 American reciprocating engines and 26 American, British and French gas turbine projects. We believe you will find it the most complete aeronautical tabulation ever published in a magazine. For your convenience, the specification tables this year have been prepared in special supplement form.

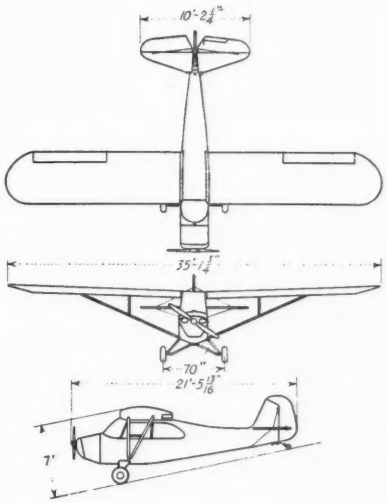


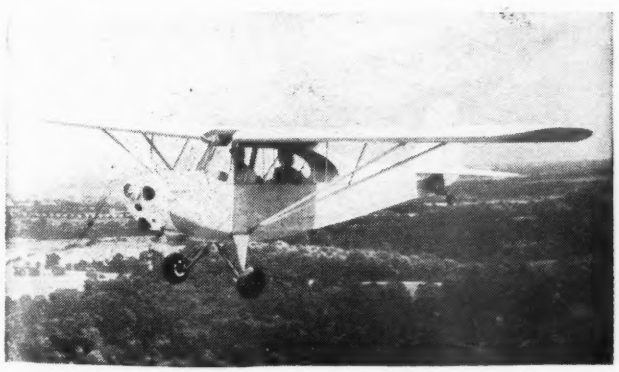
Aeronca Chum

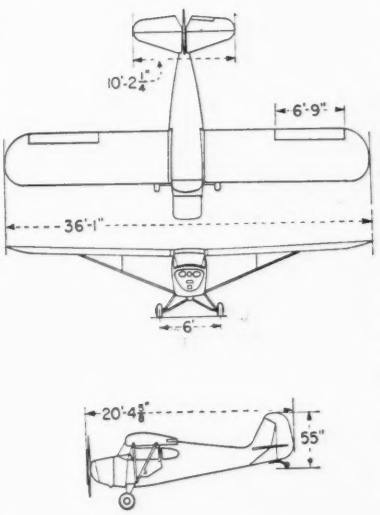
Aeronca's latest personal plane features two-control system licensed under Weick patent. Non-spinnable, it has side-by-side seating, and low cowling line. Continental 85-hp. engine gives 108-mph. cruising speed, and 118-mph. top speed. Chum lands at 49 mph. on fixed tricycle gear. Cruising range is 400 mi. with 540 lb. useful load, and 1400 lb. gross weight. Baggage capacity is 60 lb. All-metal, except for fabric covered wings.

Aeronca Champion

This tandem lightplane features improved visibility through one-piece formed windshield; simplified brake system; and built-in tiedown rings. Priced at $2,475, FAF, it is powered by 65-hp. Continental engine, and cruises at 90 mph. Top speed is 100 mph., and landing speed 38. With 15 gal. fuel capacity, cruising range is 270 mi. Lifting useful load of 510 lb., brings gross wt. to 1,220 lb. Wing loading is 7.2 lb./sq. ft.

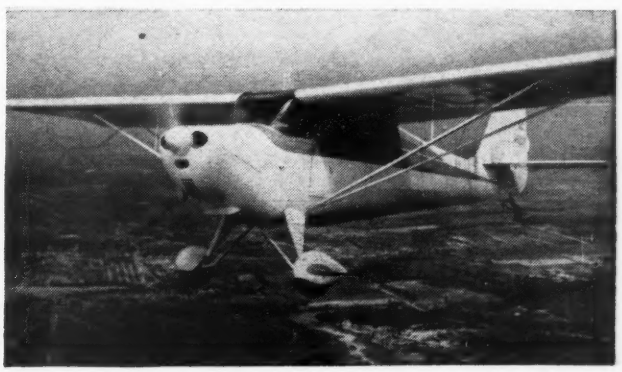


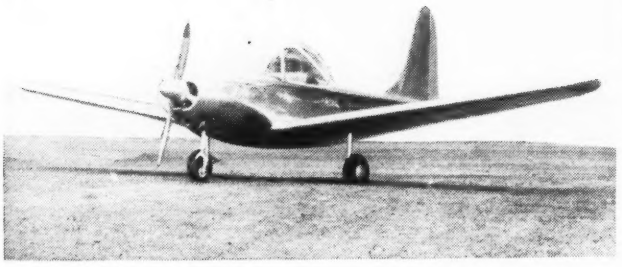




Aeronca Chief

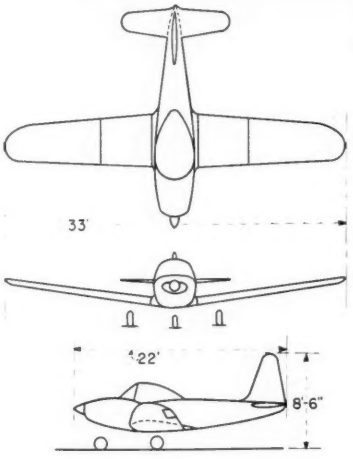
Offering adjustable side-by-side seats, one-piece windshield, and starter, the Chief sells for $2,665. Engine is 65-hp. Continental, and cruising and top speeds are 90 and 100 mph. respectively. Landing speed is 38 mph.; and cruising range is 420 mi. on 23 gal. of fuel. Chief has a gross weight of 1,200 lb. (1,350 lb. as seaplane), and carries a useful load of 525 lb. Climb is 500 fpm. Parking brake, and steerable tailwheel are standard.

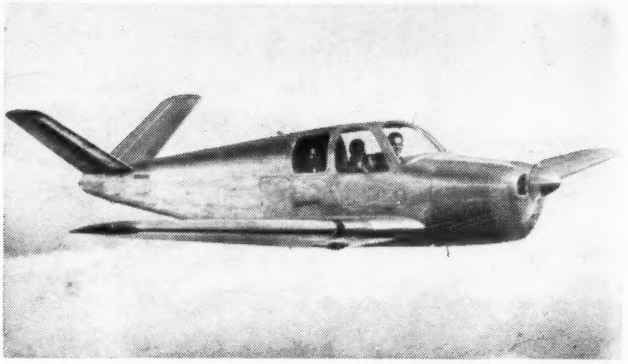




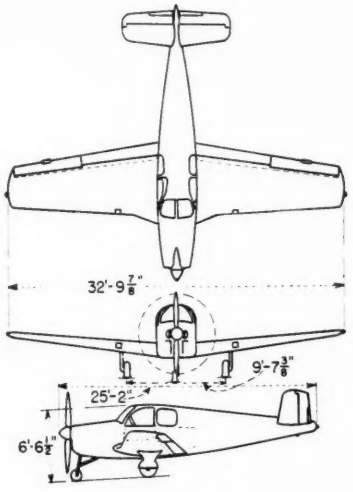
All-American Ensign

Two-place, all-metal design is powered by Continental 85-hp. engine. Cruising speed is 115 mph., and top speed 125 mph. Using fixed tricycle gear, landing speed is 50 mph. With 25 gal. fuel capacity, range is 500 mi. Rear half of bubble canopy slides back to permit entrance. Empty weight is 900 lb., and gross weight comes to 1,450 lb. Rate of climb is 750 fpm. Use of 100-hp. engine and retractable gear is being studied.





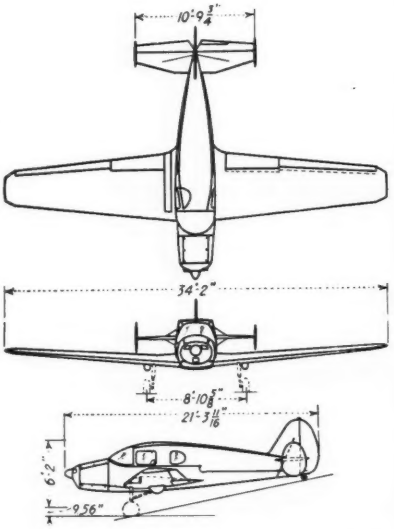
Beechcraft Bonanza

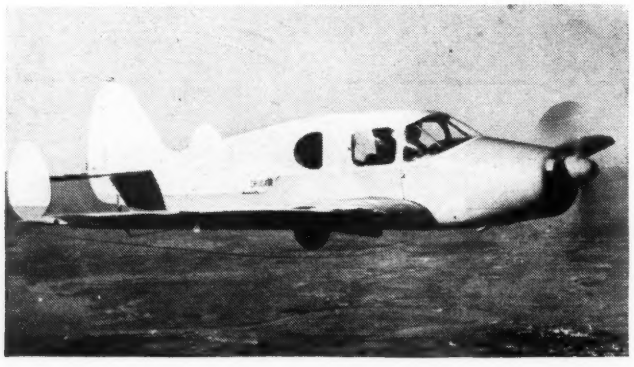


Introducing the "butterfly" tail, all-metal Bonanza carries four people, and is powered by 165-hp. Continental engine. Cruising speed is 175 mph. (at 10,000 ft.) and top speed is 184 mph. With flaps, it lands at 55 mph. on retractable tricycle landing gear. Fuel capacity of 40 gal. allows a range of 700 mi. Takeoff run is 425 ft.; landing run is 315 ft. Payload with full tanks is 780 lb.; gross weight 2,550 lb.; empty wt. 1,490 lb. Price is $7,975.

Bellanca Cruisair

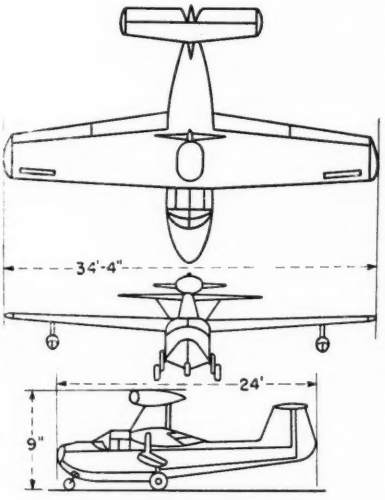
Powered by 150-hp. Franklin engine, this four-seater cruises at 153 mph., and has a top speed of 169 mph. With flaps, landing speed is 45 mph. Fabric covering used, except for plywood on wing. 40-gal. fuel capacity gives 600-mi. range. Sea level climb is 1,130 fpm., service ceiling 16,000 feet. Gross weight adds up to 2,100 lb., and empty weight 1,210 lb. When retracted, main wheels protrude below wing as safety feature.

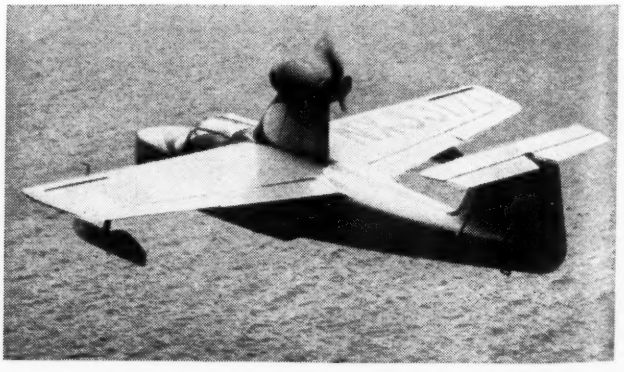




Bunyard Sportsman

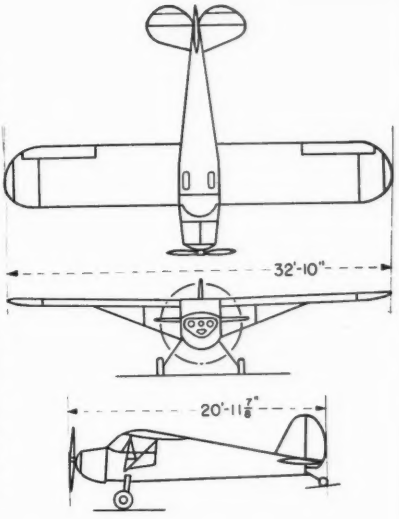
Clean lines of this four-place amphibian account for its 118-mph. cruising speed with 185-hp. Continental engine. Top speed is 133 mph., and landing speed with flaps 55 mph. Steerable nose wheel retracts into hull, and main wheels swing up under wing. Fuel capacity is 35 gal., and range 680 mi. With a gross weight of 2,750 lb., Sportsman climbs at 590 fpm., and has service ceiling of 9,500 feet. Wood and plywood construction.

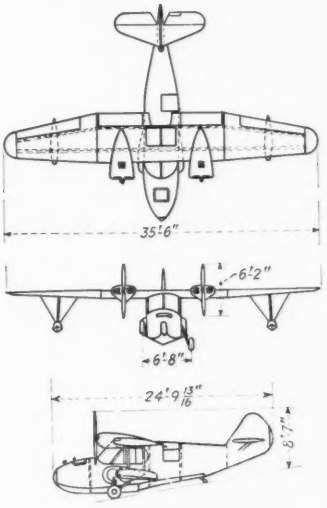




Cessna 140

All-metal except for fabric covered wing, 140 cruises at over 100 mph., tops 120 mph., and lands with flaps at 41 mph. Spring-steel landing gear gives added streamlining. Fuel capacity of 25 gal. provides a 450-mi. range. Gross weight is 1,450 lb., and empty weight 770 lb. Two narrow skylights in cabin roof improve visibility. Rate of climb is 680 fpm. Less expensive 120 model is identical with exception of flap, rear windows, and deluxe interior.



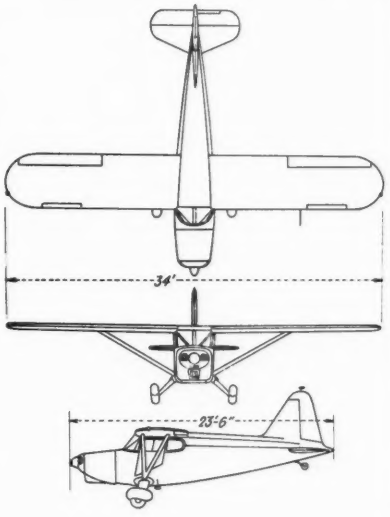


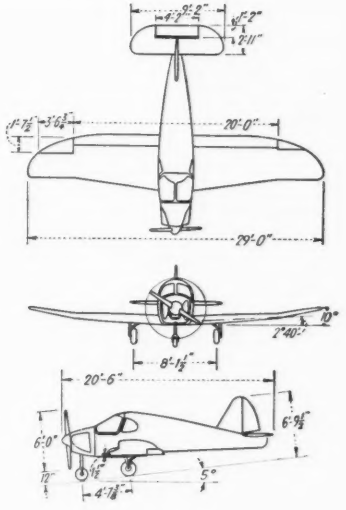
Commonwealth Trimmer

This 3-place amphibian is powered by two 85-hp. Continental engines, and cruises at 115 mph. Top speed is 135 mph.; while with flaps it lands at 48 mph. Cruising range is up to 500 mi. with 40 gal. of gas. Empty craft weighs 1,470 lb.; gross weight is 2,200 lb. Rate of climb is 850 fpm., and altitude can be maintained on one engine. Wood and plywood structure used throughout. Hull is of molded plywood with bonded phenolic paper finish.

Stinson Voyager 150

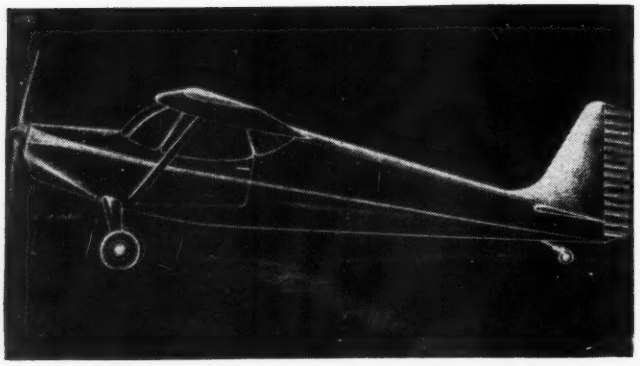
Latest model of famous Voyager line carries four people, and is powered by 150-hp. Franklin engine. Cruising at 125 mph., it tops 133 mph., and lands at 51 mph. Takeoff distance (sea level) is 620 ft.; landing run 290 ft. Fully loaded, craft weighs 2,230 lb.; empty weight is 1,224 lb. Station Wagon version has removable back seat, and can carry pilot and 600 lb. of cargo. Rate of climb is 650 fpm. at sea level.





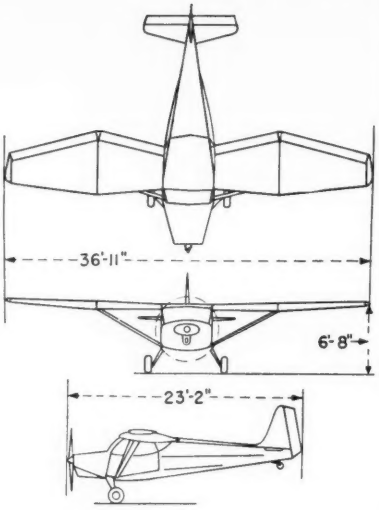
Culver V

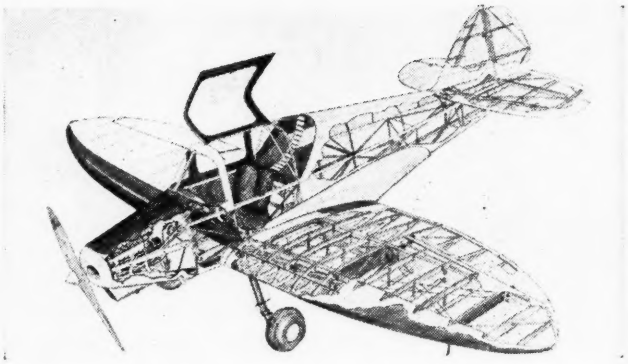
Featuring Simpli-Fly control coordination, V cruises at 120 mph., and tops 130 mph. with 85-hp. Continental engine. Its single large flap gives a landing speed of 55 mph.; and it has side-by-side seating, and retractable tricycle landing gear. Range is 420 mi. on 25-gal. fuel capacity. Gross weight is 1,600 lb.; empty weight 1,070 lb. At sea level, rate of climb is 660 fpm.; service ceiling is 12,500 ft.



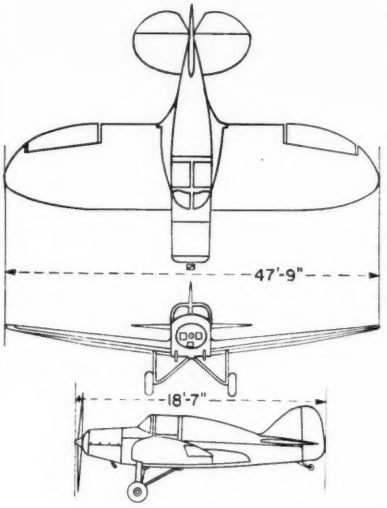
Dansaire Coupe

Carrying three people side-by-side on wide seat, Coupe has 100-hp. Franklin engine and 115-mph. top speed. With 100-mph. cruising speed, range is 500 mi. on 30 gal. of fuel. Landing speed is 48, and rate of climb 600 fpm. Service ceiling, with a gross weight of 1,800 lb., is 14,000 ft. Weight empty is 1,065 lb. Strut-braced, angular shaped wing is employed. Fuselage structure is riveted aluminum alloy tube with three longerons.





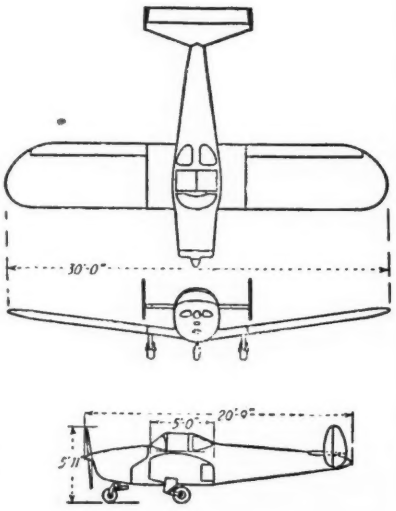
Dart GC

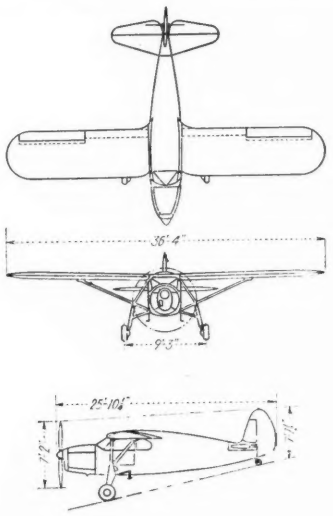


A pre-war type improved by use of 100-hp. Continental engine. Dart cruises at 125 mph., and has a top speed of 140 mph. It lands at 40 mph. on fixed gear. Dual stick controls, side-by-side seating, 25-gal. fuel capacity, and 500-mi. range are other features. Gross weight is 1,550 lb.; empty weight 1,040 lb. First minute's climb is 850 feet, and the wing loading adds up to 16.55 lb. Fabric covered, steel tube structure used.

Ercoupe AA-2

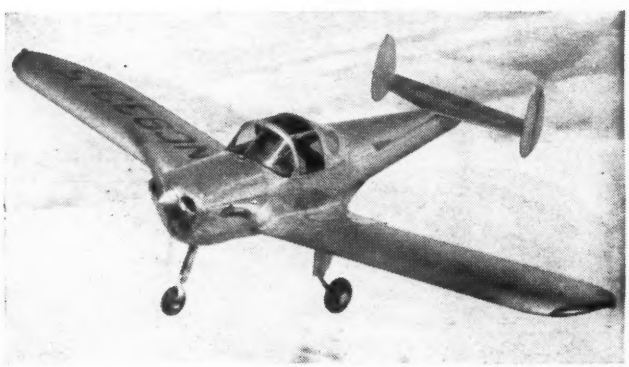
Well-known, spin-proof, two-control plane seats two side-by-side, and is powered by 75-hp. Continental engine. All-metal, except for fabric covered wing, it cruises at 110 mph., has a top speed of 127 mph., and lands at 48 mph. With 23 gal. of gas, cruising range is 500 mi. Rate of climb is 750 fpm., and ceiling 14,000 ft. Gross weight comes to 1,260 lb., and empty weight is 750 lb. It has steerable nose wheel and starter.

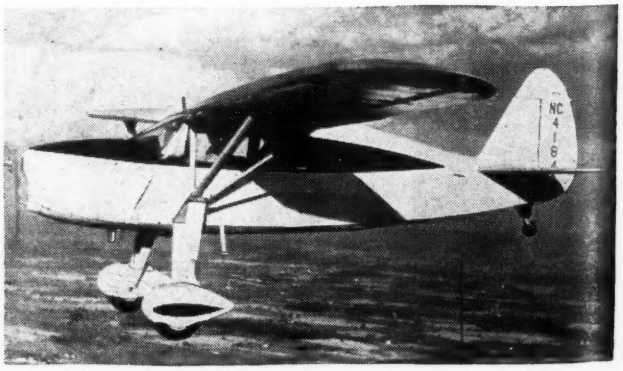




Fairchild 24R

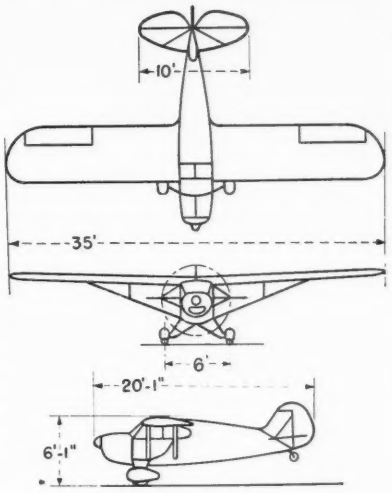
Improved version of well-known, time-tested design, F-24 is available with either Ranger 175-hp. or Warner 165-hp. engine. With Ranger it carries four passengers at cruising speed of 118 mph. Top speed is 133 mph., and landing speed with flaps 53 mph. Carrying a gross weight of 2,562 lb., range is 620 mi. with 60-gal. fuel capacity. Empty weight is 1,650 lb., and dual stick controls, starter, and navigation lights are standard.

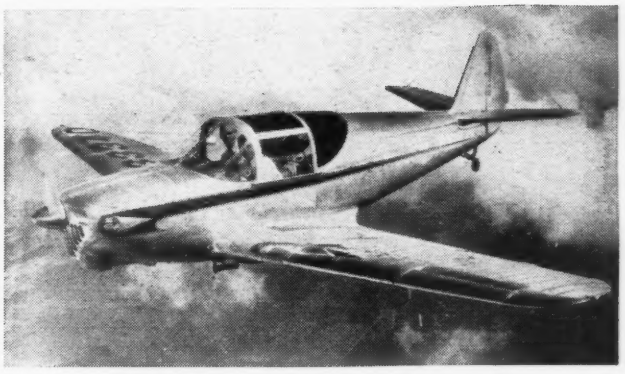




Funk Bee F2B

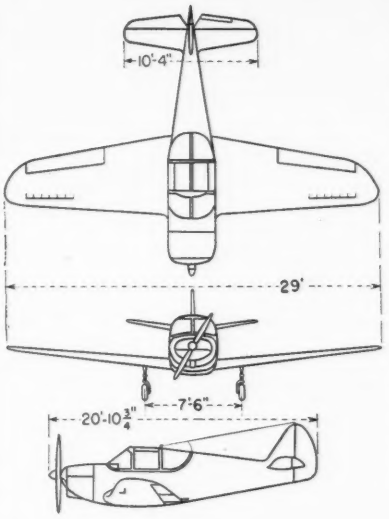
Seating two passengers side-by-side, Bee cruises at 100 mph. with 85-hp. Continental engine. Top speed is 112 mph., and landing speed 37 mph. This 870 lb. craft lifts a gross weight of 1,350 lb. in a takeoff distance of 400 ft. Rate of climb is 800 fpm., and with 20-gal. fuel capacity, cruising range is 350 mi. Wing has spruce spars and ribs, and is fabric covered. Starter, radio, and wheel pants are standard.





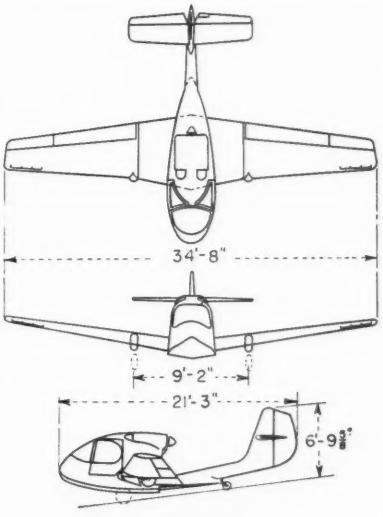
Globe Swift GC-1B

Boasting a cruising speed of 140 mph., all-metal Swift has side-by-side seating, and 43-mph. landing speed with flaps. Top speed is 153 mph., and initial climb 800 fpm. It takes off in 400 ft., and lands in half that distance. Cruising range is 600 mi. with 30 gal. of fuel; and service ceiling is 16,000 ft. Gross weight of 1,570 lb. loads wing to 11.93 lb. sq. ft.; and empty weight is 940 lb. Retractable gear has 9 ft. 9 in. tread.



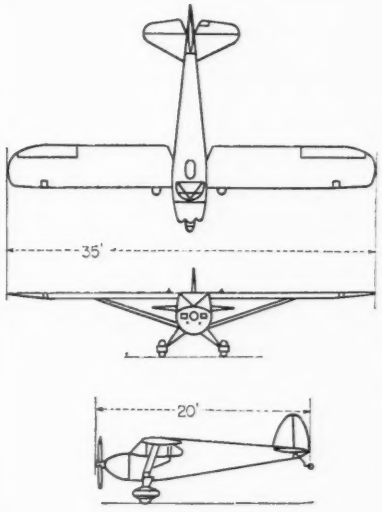
International Aviation

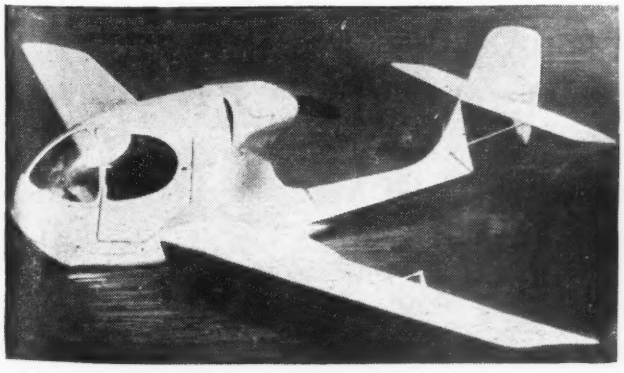
Outstanding feature of this novel all-metal, two-place amphibian will be low wing designed so inboard root end acts as sponson. This improves performance by eliminating wing floats. Cabin located ahead of wing offers good visibility, and has 52-in. seat width. Planned cruising speed is about 120 mph. with gross weighht of 1,500 lb., including 500-lb. useful load. Flaps give glide path control.

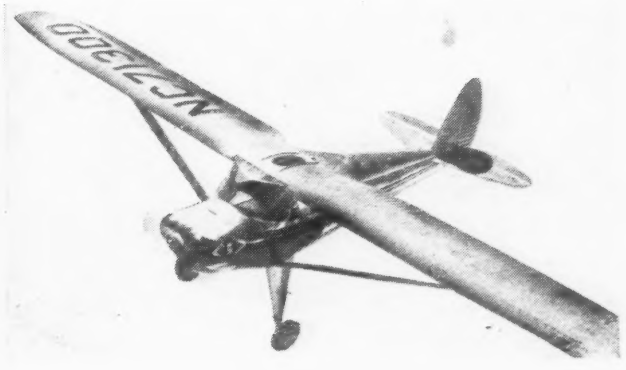


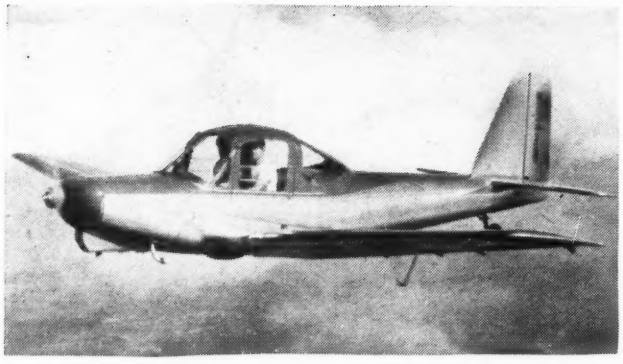
Luscombe Silvaire 8-E

Completely all-metal including wing covering, latest Silvaire cruises at 115 mph. with its 85-hp. Continental engine. Top speed is 133 mph., and landing speed 52 mph. Weighing 1,400 lb. fully loaded, craft will fly 550 mi. on 28 gal. of fuel with two passengers. Rate of climb is 750 fpm. for the first min. after sea-level takeoff. Empty weight is 850 lb., and wing loading 10 lb. per sq. ft. Service ceiling is 15,000 feet.



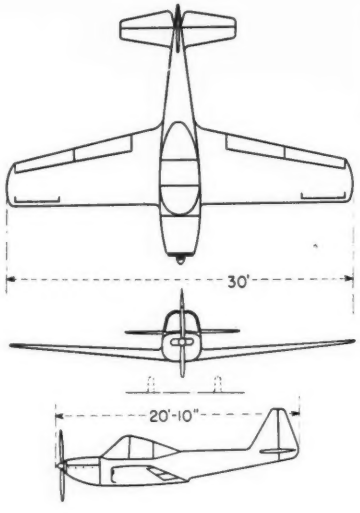


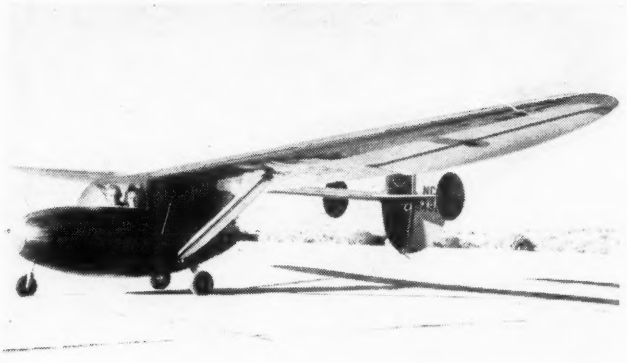


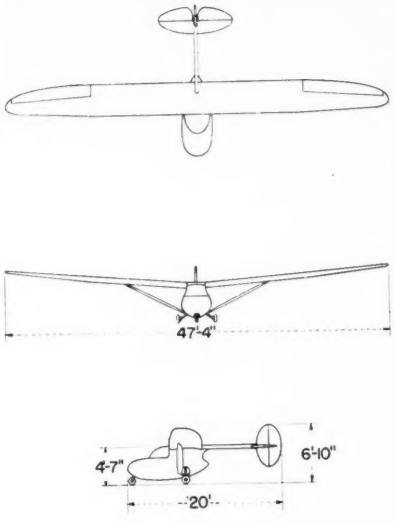


Meyers MAC 125-C

Smooth lines, retractable landing gear, and a 125-hp. Continental engine give this new all-metal personal plane a top speed of 140 mph. and a cruising speed of 120 mph. With flaps, landing speed is 45 mph. and climb is 700 fpm. Loaded to gross weight of 1,675 lb., with 2 passengers sitting side-by-side, 50 lb. of baggage, and 30 gal. of fuel, it has 500-mi. range. Empty weight is 1,090 lb., and service ceiling 14,000 ft.





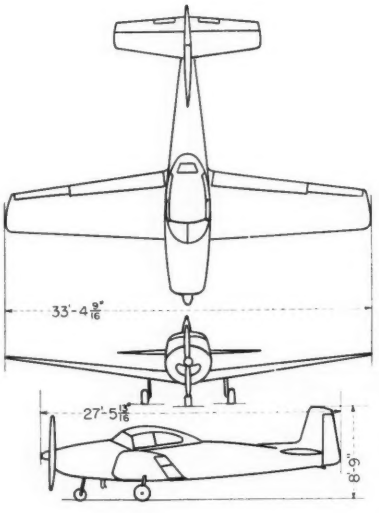


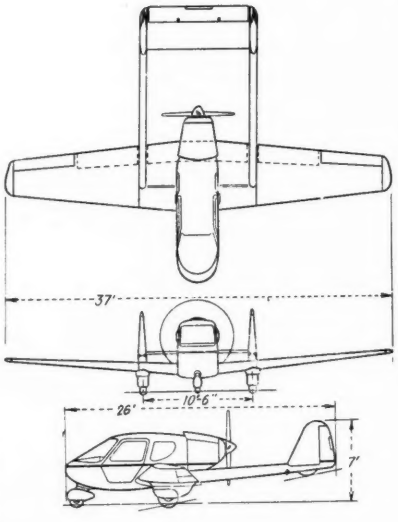
Nelson Dragonfly

First to be NC'd in new CAA category, this "glider with auxiliary power" seats two side-by-side, is powered by 25-hp. engine weighing 50 lb., and cruises at 65 mph. Three-gallon fuel tank allows range of up to 125 mi. Other features are: Dual controls, retractable tricycle gear, and detachable wings for easy storage. Fuselage is of molded plastic plywood, with dural tail boom. Landing speed is given as 38 mph., and gross weight 935 lb.

North American Navion

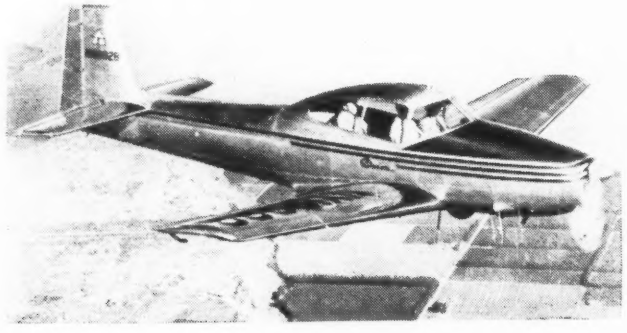
An all-metal, four-place plane, Navion sells for $6,750, with controllable pitch prop., GE radio, and landing lights. With 185-hp. Continental engine, cruising speed is 150 mph., and top speed 160 mph. Flaps give 53 mph. landing speed. Cruising range is 700 mi. with 40-gal. fuel capacity. Takeoff run is 695 ft., and landing run 605 ft. Gross weight totals 2,570 lb. either 80 lb. of baggage or 645 lb. of cargo may be carried.

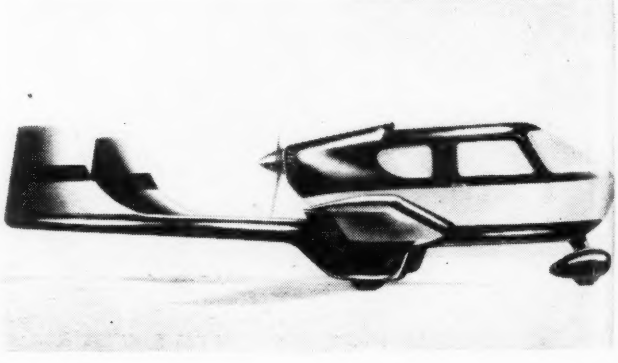


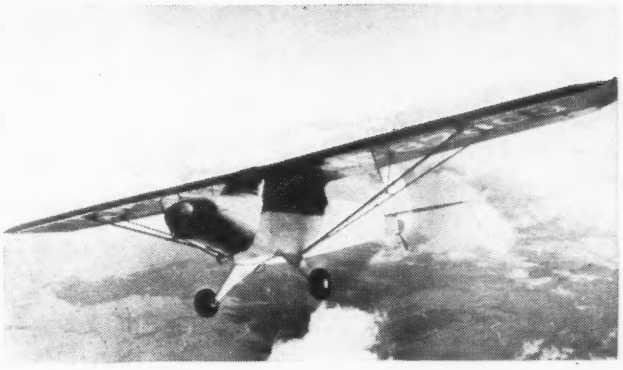


Puget Pacific Wheelair

A twin-boom pusher now under construction, four-place craft is designed to cruise at 120 mph., with Lycoming 160-hp. engine. Top speed to be 135 mph., and landing speed 55 mph. Fixed tricycle gear with steerable nose wheel is to be provided. Grossing 2,505 lb., including 160 lb. of baggage and 50 gal. gas. Wheelair has cruising range of 600 mi., and 670 fpm. rate of climb. Weight empty is 11,350 lb., and ceiling 11,500 ft.

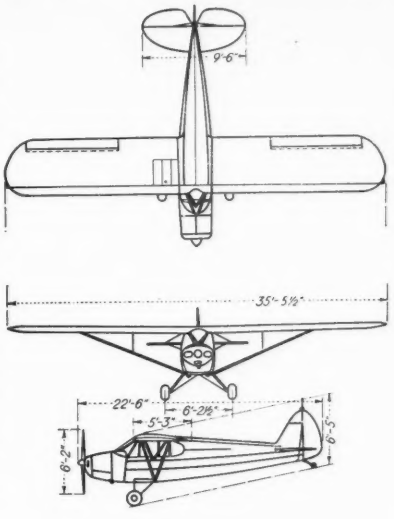


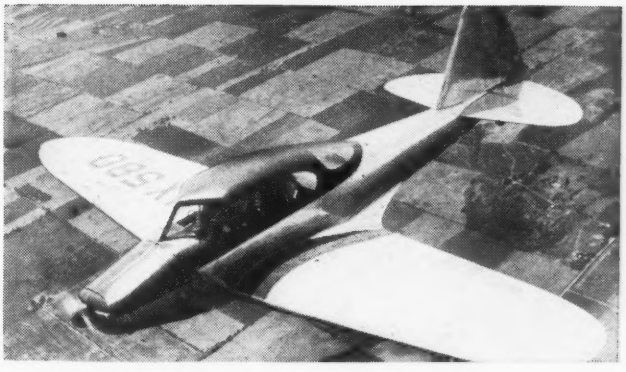


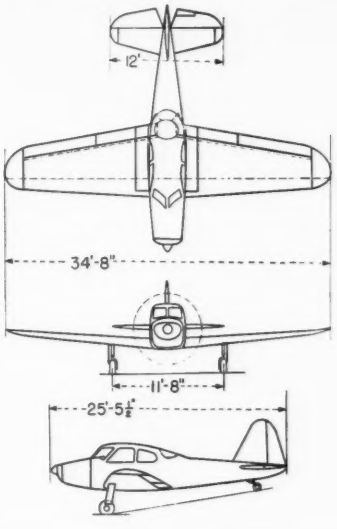


Piper Super Cruiser

Boasting improved performance over its pre-war predecessor, this 100-hp., 3-place plane cruises at 103 mph., and has a top speed of 115 mph. Soundproofing and muffler on Lycoming engine lowers noise level. Landing speed is 48 mph. with gross weight of 1,750 lb.; empty weight is 1,000 lb., and baggage capacity 41 lb. With 38 gal. fuel capacity, range is 600 mi.; and ceiling 15,500 ft. Price is $3,295, FAF, Lock Haven, Pa.





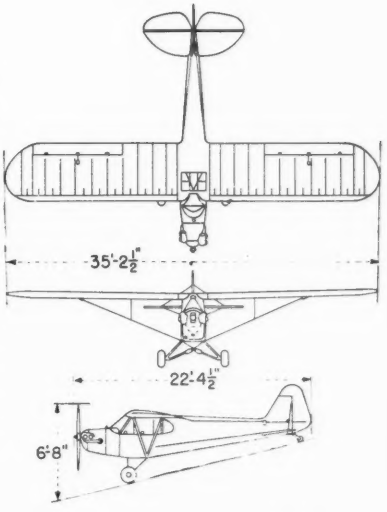


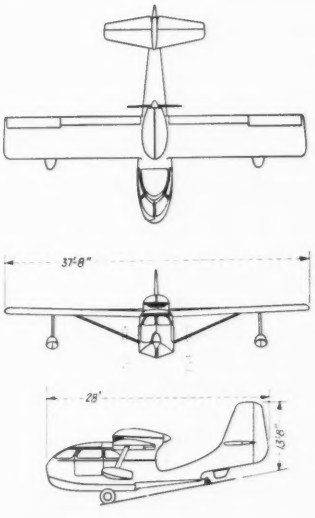
Piper Skysedan PA-6

Aimed at low-price, four-place market, Piper hopes this all-metal monoplane will become family plane. With 165-hp. Continental engine, cruising speed is 140 mph., top speed 160 mph., and landing speed, with split flaps, 49 mph. A range of 620 mi. is possible with 40-gal. of gas. Landing gear is retractable; and gross weight totals 2,400 lb. "Turret top" cabin has wide door, and windshield wipers. Photo shows prototype.

Piper Cub Special

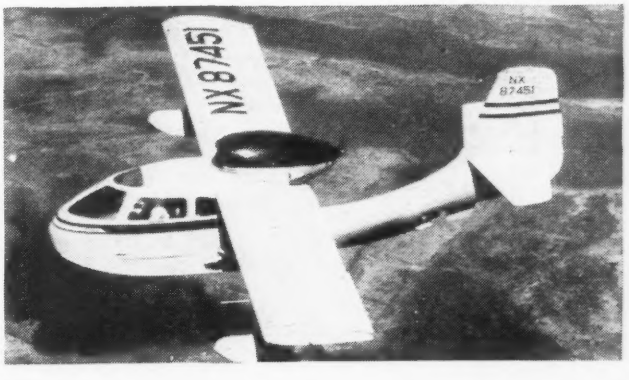
Priced at $2,295, this familiar trainer seats two in tandem, and has 65-hp. Continental engine. Of fabric-covered, welded steel tubing construction. Cub has aluminum wing spars, also a cabin skylight. High speed 83 mph., cruising speed 73 mph., and landing speed 37 mph. Twelve gallon fuel tank gives 200-mi. range; and sea level climb 450 fpm. Empty weight is only 680 lb., and wing loading 6.8 lb. Brakes are standard equipment.





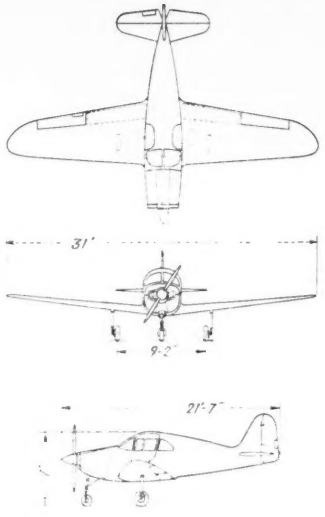
Republic Seabee

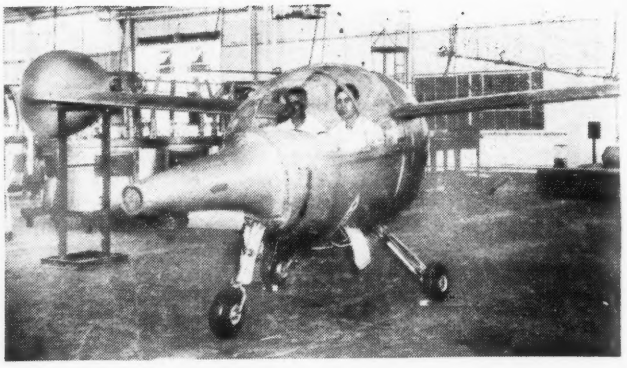
Striving to cut cost through mass production methods and structural simplification, 4-place amphibian is now priced at $6,000 including reversible-pitch propeller and two-way radio. Franklin 215-hp. engine pushes craft at 103-mph. cruising speed, and 120-mph. top speed. Landing speed is 58 mph. At a gross weight of 3,000 lb., 75-gal. fuel capacity allows a range of 550 mi. Empty weight is 1,950 lb., and rate of climb 700 fpm.

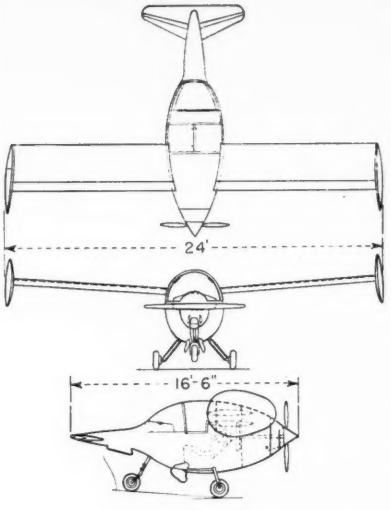


Rocket

A high-speed personal plane. Rocket cruises at 185 mph., and carries two passengers seated side-by-side. Engine is 190-hp. Lycoming, and 56-gal. fuel capacity gives a 900-mi. cruising range. Top speed is 200 mph., and landing speed 54 mph. Wing has plywood covering, with spruce spars and ribs. Tricycle landing gear is retractable; and initial climb is 2,000 fpm. Fuselage, of welded steel tubing, is fabric covered.





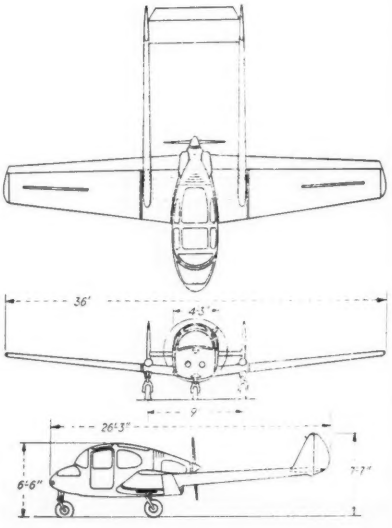


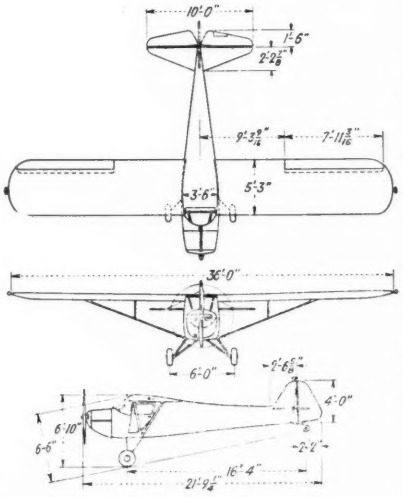
Rohr M. O.-1

Employing radical design features, this all-metal canard type seats two side-by-side, and uses pressurized air routed through ducts in wing and fuselage to operate all control surfaces. With 65-hp. engine buried in rear of fuselage, high speed of 150 mph., and landing speed of 40 mph. are expected. Gross weight is 1,010 lb., and empty weight 495 lb. Wings fold for towing behind car, and tricycle gear retracts.

Skycraft

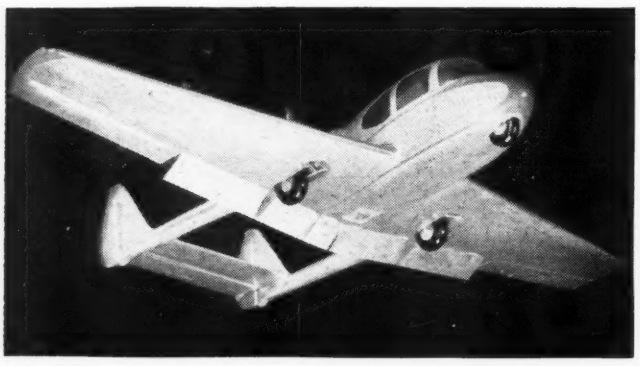
This all-metal pusher provides good visibility for all four passengers, and will cruise 620 mi. at 142 mph. Lycoming 190-hp. engine gives a 162-mph. top speed, and flaps cut landing speed to 49 mph. Fuel capacity is 50 gal., and gross and empty weights are 2,800 lb. and 1,510 lb. respectively. Starting with initial climb of 720 fpm., 13,750 foot ceiling can be reached. Semi-retractable tricycle gear offers some protection in belly landings.

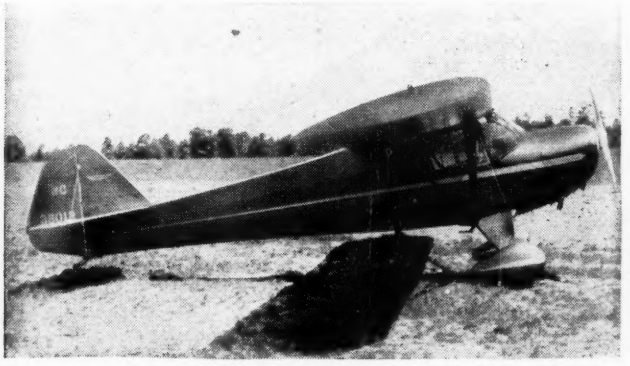


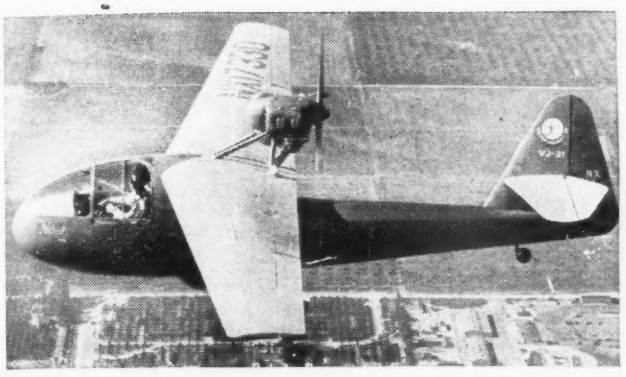


Taylorcraft Twosome

Seating two passengers side-by-side, 65-hp. Continental engine gives Twosome a 95 mph. cruising speed, and 105 mph. top speed. Landing speed is 38 mph. Eighteen-gallon maximum fuel load allows a cruising range of 378 mi. Gross weight is 1,200 lb., and empty weight 730 lb. Sea level climb is 600 fpm., and craft will reach 15,000 ft. altitude. Entire plane is fabric-covered, with wood spars used in wing.

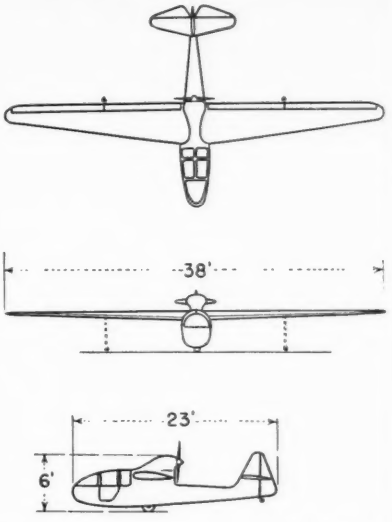


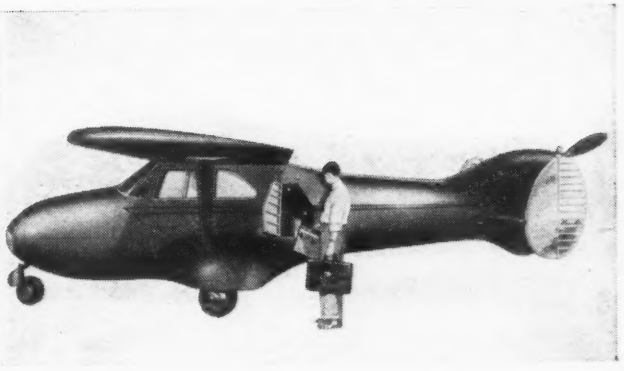


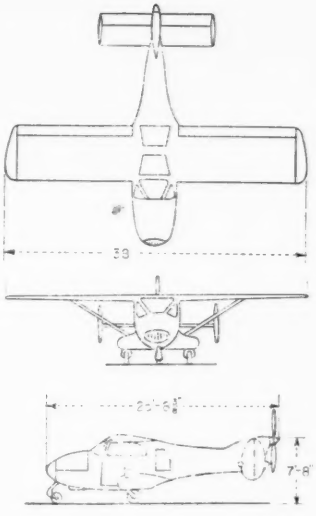


Volmer VJ-21

New all-metal design has mono-wheel landing gear, which proved successful in rough terrain tests of prototype. But producers believe conventinal tricycle gear will sell better, and plan to use it. Production model may carry three. Continental 75-hp. engine provides 110-mph. cruising speed, and 120-mph. top speed. Gross weight of 1,350 lb. includes 20 gal. of fuel for 500 mi. cruising range. Take-off distance is 400 ft., and climb 750 fpm.





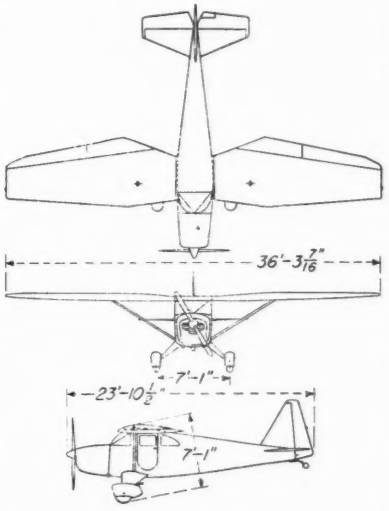


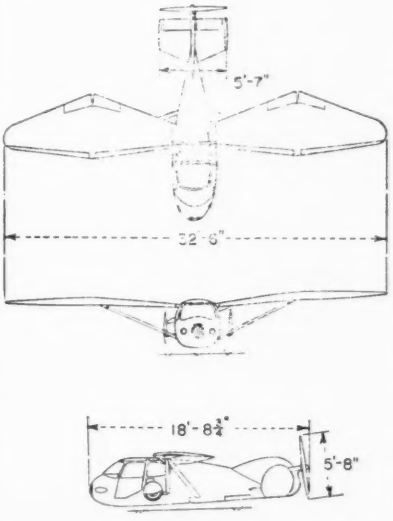
Waco Aristocraft

First personal plane to be scheduled for production with propeller in extreme tail, new 4-place Waco is non-spinnable and has simplified controls. Franklin 215-hp. engine located in nose, turns prop. by means of extension shafts. Cruising speed is 135 mph., top speed 154 mph., and landing speed 65 mph. Sixty gallons of fuel permits 605-mi. range, and rate of climb is 950 fpm. Gross weight is 3,130 lb., empty weight 2,046 lb.

Weatherly - Campbell Colt

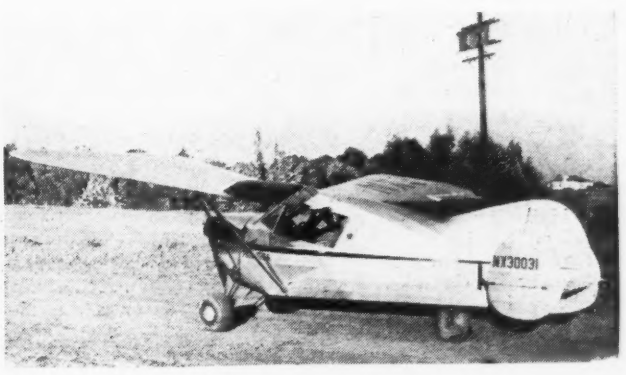
Four-place, all metal design is now being groomed for early production at Dallas, Texas. Planned to sell in $5,000 class, it is powered by 190-hp. Lycoming engine, cruises at 140 mph., and tops 160 mph. Maximum range with 60 gal. of fuel, radio, and 120 lb. of baggage, is 750 mi. Rate of climb is 1,000 fpm., and total weights come to 2,600 lb. fully loaded, and 1,400 empty. Landing speed, with flaps, is 52 mph. Metal monospar wing.

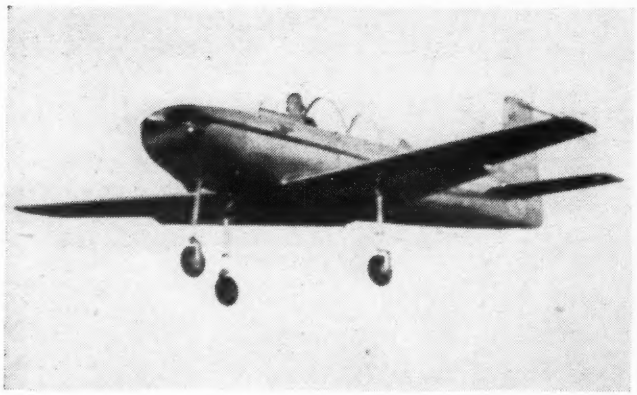




Whitaker-Zuck Plane-Mobile

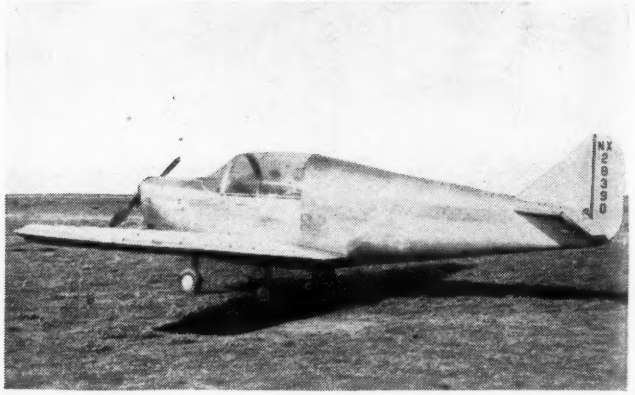
Hand-made by its co-designers, this roadable plane features variable - incidence folding wings, retractable tail flaps, and use of two-control principles. With 40-hp. Continental engine, two-seater weighs 1,150 lb. loaded, and 740 lb. empty, and has a 45-50 mph. minimum flying speed. "Ailerators" on wing's trailing edges vary angle of attack; and single rear wheel drives craft on ground. Three-view shows deluxe version planned.





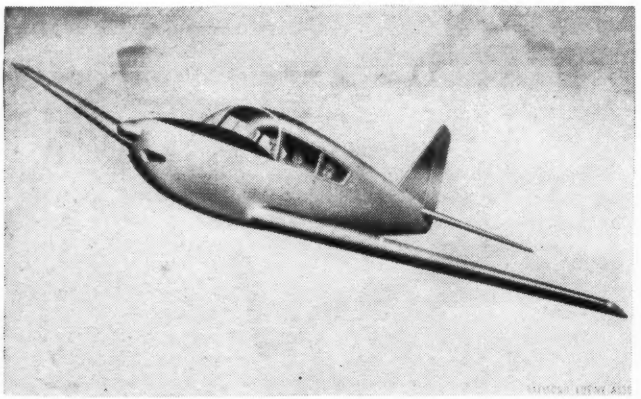
Aero-Flight Streak

Adopting design principles of high-speed military aircraft to the lightplane, Aero-Flight offers a craft that cruises at 150 mph. plus, on 85-hp. Continental engine. Seating two in tandem, it has top speed of 170 mph., cruising range, fully loaded, of 700 mi., and 1,025 fpm. climb. Priced at $3,990, it will have constant speed prop., starter, and two-way radio. Tricycle landing gear is retractable.



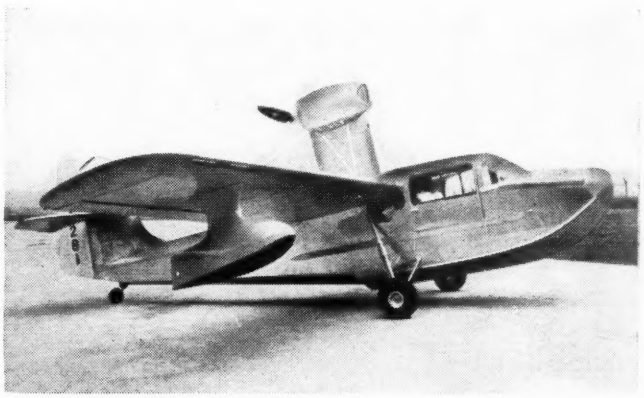
Emigh Trojan

Radically simple structure, and ease of building, make 2-place, all-metal Trojan extremely interesting. Using symmetrical air-foil, wing has no ribs, and in effect is pre-formed shell attached in upper and lower identical halves to two shear beams. Powered by 85-hp. Continental, plane cruises at 120 mph., lands at 38 mph., has 700 mi. range, and is expected to sell for under $3,000.



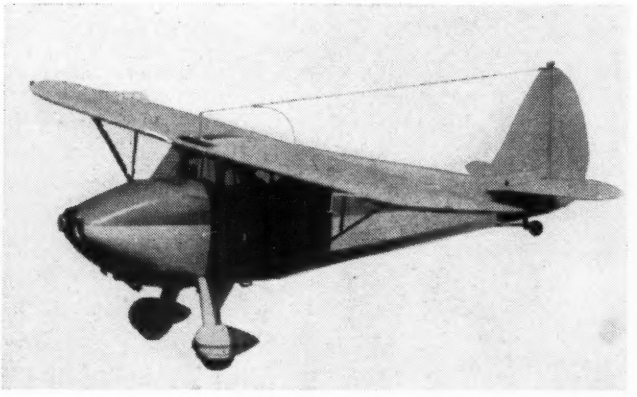
Fairchild

Having acquired production facilities for its new Personal Planes Division in a former Army plant at Strother Field, near Winfield, Kansas, Fairchild is now pushing development of a new four-five place, low-wing design. The prototype of this craft is scheduled to fly early in 1947. Company says long range and high performance are being stressed.



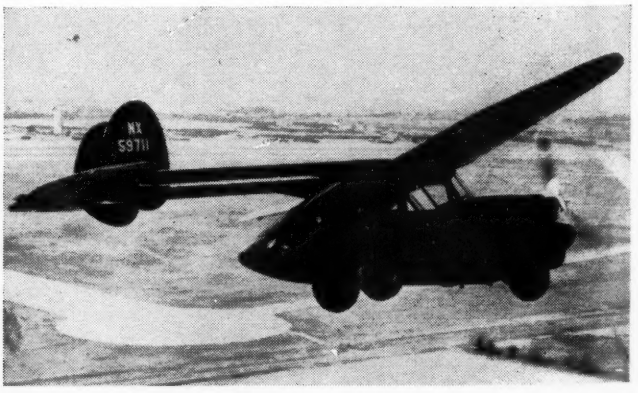
Goodyear GA-2

Although company has announced no production plans, this 3-place amphibian recently received NC license. With 145-hp. Franklin engine, it has cruising speed of 110 mph., top speed of 125 mph., and landing speed of 55 mph. Construction is all-metal, except for fabric wing covering and molded plastic wing floats; and 400-mi. range is possible with 30-gal. fuel capacity.



Hockaday Comet

This high-wing monoplane seats two, side-by-side, and cruises at 125 mph., with a top speed of 140 mph. Power plant being optional, plane is priced at $3,350 with Franklin 125-hp. engine, or $3,425 with Continental engine of same output. At a gross weight of 1,800 lb., rate of climb is 1,150 fpm., and service ceiling 19,000 ft. Cruising range is 500 mi., and baggage cap. 100 lb.

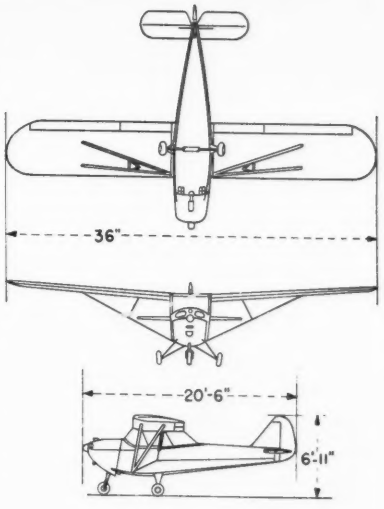


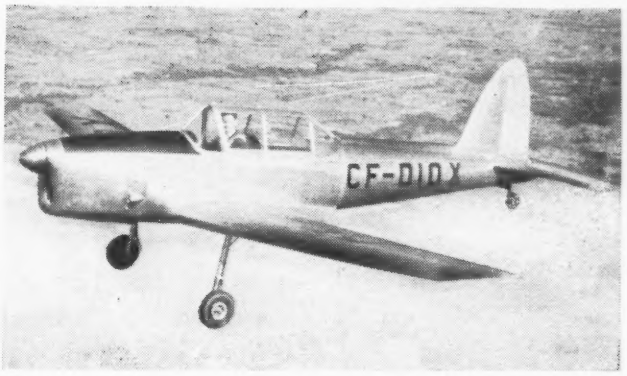
Southern Roadable

Experimentally built and test flown by Southern Aircraft, this two-seater has removable wings, tail, and propeller. Powered by 130-hp. Franklin engine, it flies at 110-mph. cruising speed, and 128-mph. top speed. Landing speed is 50 mph., and gross weight 1,800 lb. On the ground, rudder controls become brake and clutch pedals. Wing span is only 30 ft. No production is planned.

Chrislea Ace

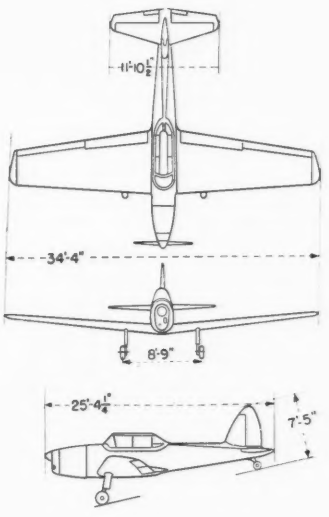
Neat little four-seater by newly formed concern is being prepared for mass output to sell for under £1,000. Powered by 130-hp. Lycoming, top speed of 123-mph. is claimed, also cruising speed of 110, and stalling of 40. Unique control system has been developed, eliminating rudder bar; and ailerons, rudders, and elevators can be operated singly or in combination by one wheel and column. Wing and power loadings are 11 and 15 lb., respectively.





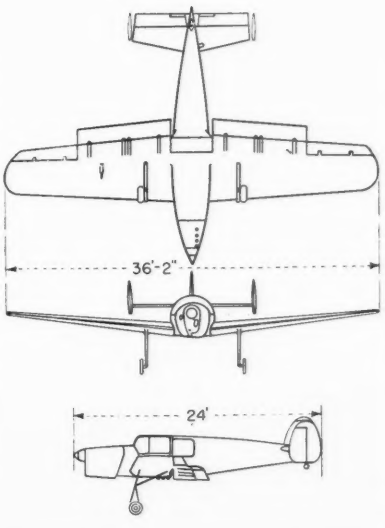
DH Chipmunk

First craft wholly designed and built by DH's Canadian branch, all-metal two-place tandem is aimed at student training. With 140-hp. DH Gipsy Major, top speed is 145 mph., cruising 127, and stalling 40 mph. Climb is said to be 1,000 fpm. Fuselage and wings are made in two sections, and fixed landing gear uses rubber shock absorbers. Craft is said to have official approval for 1,500 hr. between overhauls. Landing run over 50-ft. obstacle is 500 yd.



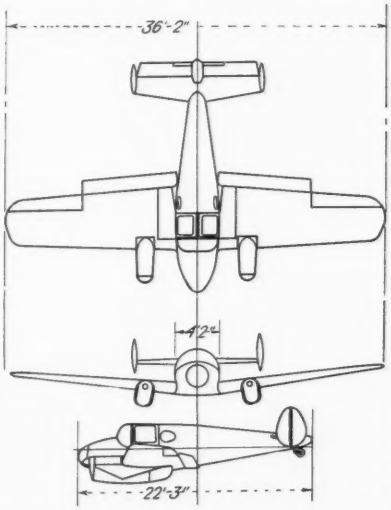
Miles Messenger

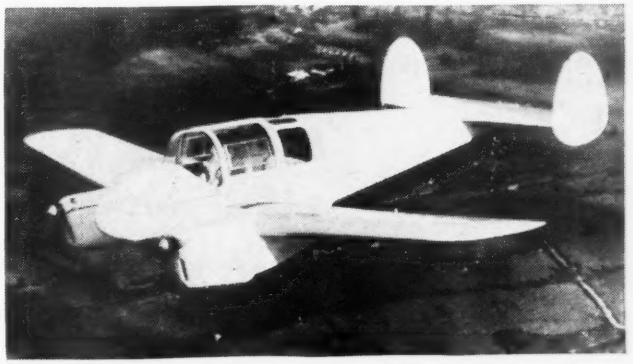
British 3-4 seater is designed for low speeds and ability to operate from restricted spaces. With 155-hp. Blackburn Cirrus, top speed of 141 mph., and cruising of 130 are claimed. Takeoff requires but 170 yd. over 50-ft. obstacle, while landing run under same conditions requires 80 yd. Range 460 mi., gross weight 2,400 lb., and empty 1,430 lb. Construction is wood and a conventional fixed landing gear is utilized. Has novel Miles airfoil-type flaps.

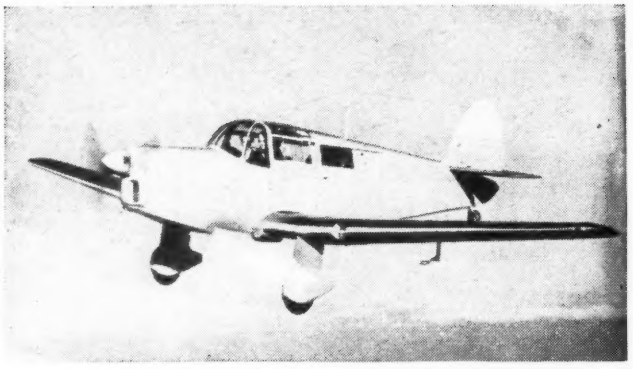


Miles Gemini

Largely a twin-engine version of Miles Messenger, Gemini seats 4 and is powered by 100 - hp. Blackburn Cirrus engines, which give craft a top speed of 150 mph., cruising speed of 135, and landing speed of 35 mph. Range on 48 gal. is said to be 800 mi. Climb is 870 fpm. Takeoff and landing runs are quoted as 310 and 125 yd. respectively, over a 50-ft. obstacle. Gross weight is 3,000 lb. and empty 1890. Windshield is one-piece.

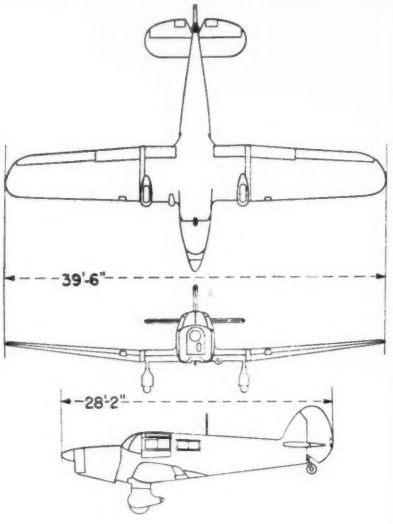






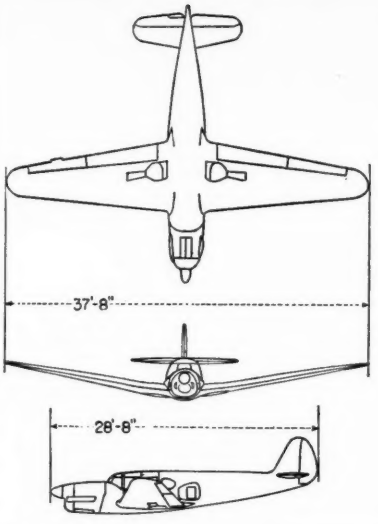
Percival Proctor V

This new four-placer, mostly of wooden construction, is credited with a 157-mph. top speed and has 208-hp. DH Gipsy Queen. Featured are folding wings. On 40 gal. of fuel, range is 500 mi. Gross weight is 3,500 lb., empty 2,340 lb. Cockpit is fitted with dual controls as standard, and full long distance instrumentation can be carried. Priced at about £3,000 craft is being vigorously pushed in export market, and many have already been sold overseas.



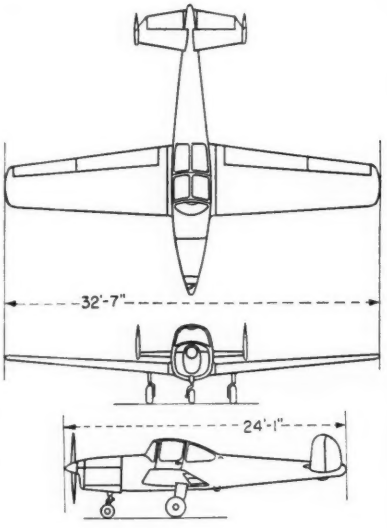
Nord 1101 Noralpha

An advanced development of a German design, this craft seats 4, and, powered by a 240-hp. Renault, has 189-mph. top speed, 172-mph. cruising, and 745-mi. range. Gross weight is given as 3,640 lb., and empty 2,094 lb. Wing area is 187 sq. ft. Of all metal construction, craft has retractable tricycle landing gear, and variable pitch prop. Normal fuel load is approximately 58 gal., although additional tankage may be installed in lieu of baggage.



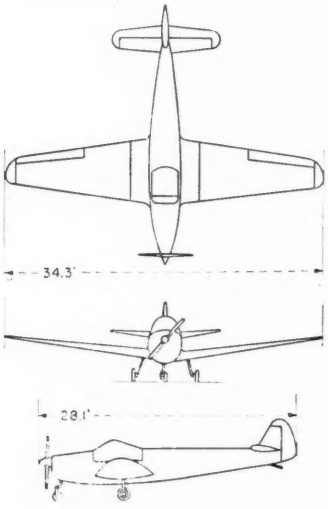
Max Holste MH-52

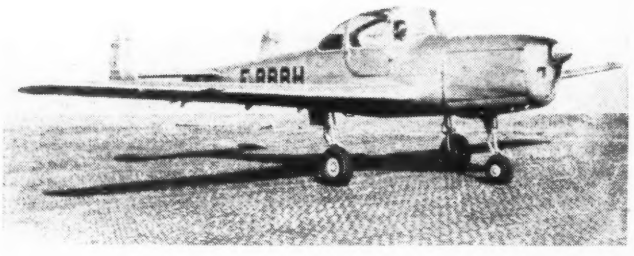
Little French two-placer has 150-hp. Potez and is said to do 144 mph. at sea level, cruise at 130, and have 46.5-mph. stalling speed. Climb is set at 790 fpm., and range as 372 mi. Grossing 1,914 lb., and weighing 1,408 empty, craft has wing loading of 14.6 lb., and 16.5 lb. power loading. Of all-metal construction including wing covering. Tricycle landing gear is fixed. MH-52 is stated to have been especially designed for mass output.



Morane-Saulnier 570

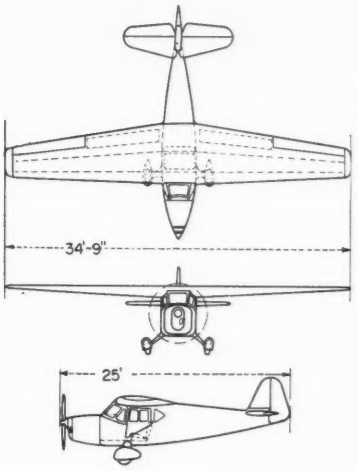
Powered by a 140-hp. Renault, this two-seat side-by-sider is all all-metal and has retractable tricycle gear. Top speed is 164 mph., cruising 146 and stalling 49 mph. Range is given as 620 mi. on 42.2 gal. Climb is 1,120 fpm., and service ceiling 24,600 ft. Gross weight is placed at 1,900 lb. and empty at 1,196 lb. Outer wing panels can be folded upwards to facilitate storage. Prop is of controllable pitch type. Wing flaps are fitted.





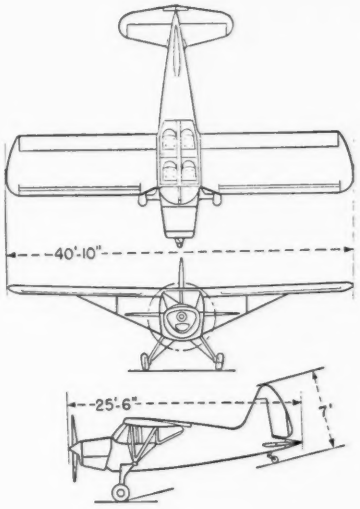
Avia 36

Czech two-placer has 65-hp. Walter Mikron and does 112 mph., cruises at 99 and stalls at 42 mph. Its range is said to be 320 mi. on 10 gal. Wings are all-wood fabric covered, fuselage consists of fab-steel tubing. With 492-fpm. climb, ceiling is given as 11,500 ft. Wheels have mechanical brakes and tail wheel is steerable. Gross weight is said to be 1,277 and empty 836 lb. Side-by-side cabin has door on each side. Wing area is 161.4 sq. ft.



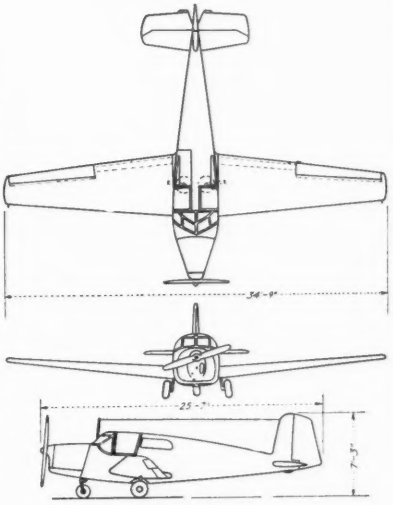
KZ VII

Developed from KZ III (photo), model VII is powered by 125-hp. Continental which gives top speed of 124 mph., and cruising of 109 mph. Landing speed is said to be 34 mph. and climb 590 fpm. Range on 24.2 gal. is 500 mi., while ceiling is given as 13,500 ft. Gross weight is 1,911 lb., while empty is 1,015 lb. Wing construction is wood, and fuselage is fabric-covered steel tubing. Takeoff takes 165 yd., landing 75 yd.



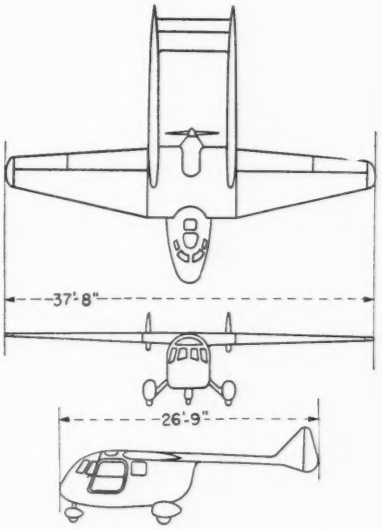
Saab Safir

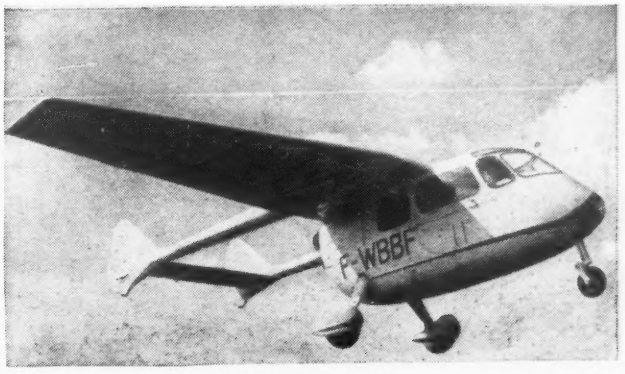
Three-place Swedish light craft is of all-metal construction and, with 130-hp. DH Gipsy, has 146-mph. top speed, cruises at 127, and lands at 50. Though it can be fitted with Edo floats (photo), craft ordinarily has retractable tricycle gear. A number have recently been sold to Ethiopia. Normal gross weight is 2,200 lb., and weight empty 1,280 lb. Wing and power loadings are 15 and 17 lb. respectively. Price is given as between 33-40,000 Kr.



S.E.C.A.N. Courlis

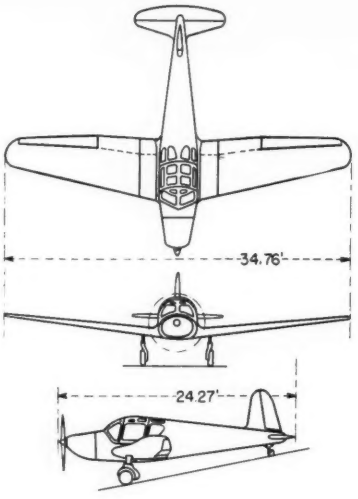
Twin-boom four-seater has fixed tricycle gear and is fitted with 197-hp. Mathis pusher engine. Top speed is 160 mph., cruising 143, and stalling 50. Range on 44 gal. is said to be 621 mi. Climb is given as 490 fpm., and service ceiling as 16,400 ft. Of all-metal fabrication, including covering, craft has top weight of 3,085 lb., and empty of 1,971 lb. Door splits horizontally to form step using lower portion.

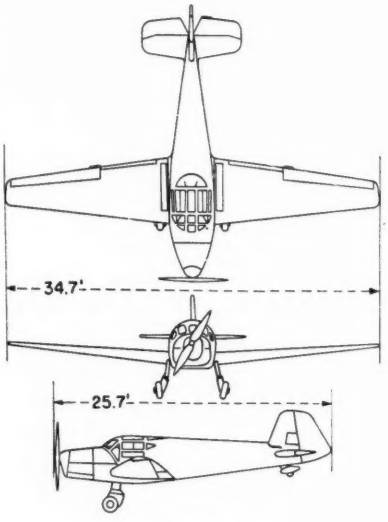




Zlin 22

Powered by a Zlin Persy of 57 hp., this Czech 2-seater has a top speed of 115 and cruises at 100. Range on 13.2 gal. is given as 437 mi. Stalling speed is 34 mph., climb 550 fpm., and service ceiling 13,775 ft. Mainly of wooden construction, fabric covered, gross is said to be 1,322 lb., and empty weight 815.5 lb. Wing and power loadings are given as 8.4 and 20.2 lb. respectively. Wing area including ailerons is 157.6 sq. ft. Tail wheel is steerable.





Zlin 281

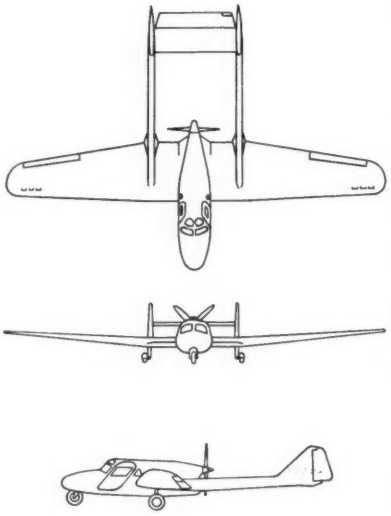
Low-wing Czech 2-seater is powered by a 94-hp. Zlin Toma and has a top speed of 125-mph., cruises at 112, and climbs at 708 fpm. Range on 26.5 gal. is given as 625 mi. Gross weight is said to be 1,763 and empty is 1,047 lb. Wing area is 145.2 sq. ft. and loadings are 12.1 and 16.5 lb. respectively. Construction is mixed: Wings being of wood, ply and fabric covered, while fuselage is partly tubing and partly wood semi-monocoque.

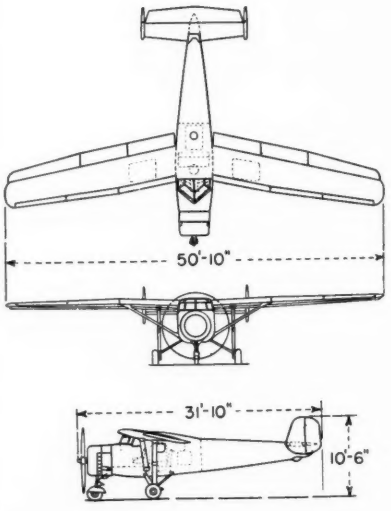
Difoga 421

Closely resembling Fokker Promotor, 421 was built during Nazi occupation of Holland. Seating two, it's powered by a 100-hp. Ford V-8 Mercury engine turning a four-blade prop. Landing gear is fixed.

Fokker Promotor

Mostly of wood construction, four-seater has 190-hp. Lycoming, also 135-mph. top speed, and 575-mi. range. Gross weight 2,980 lb., empty 2,030. Has retractable tricycle landing gear.



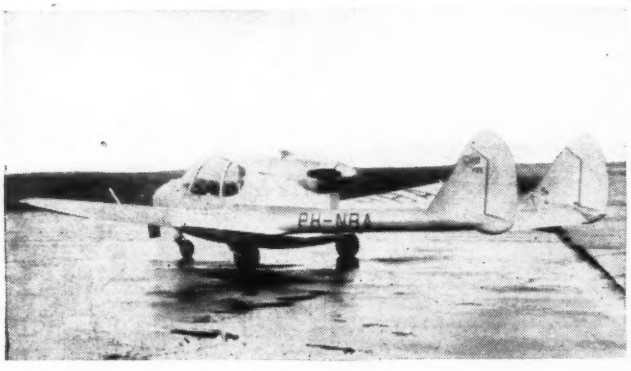


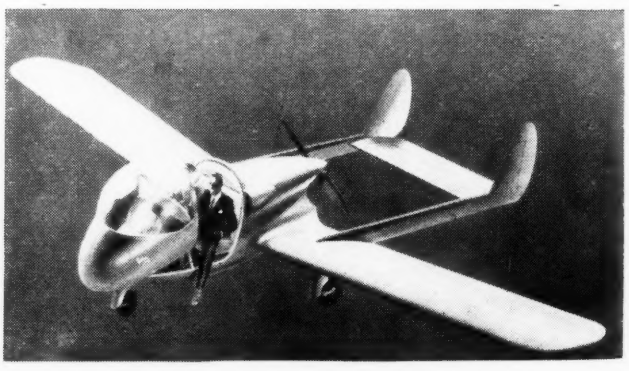
Pliatus SB-2 Pelican

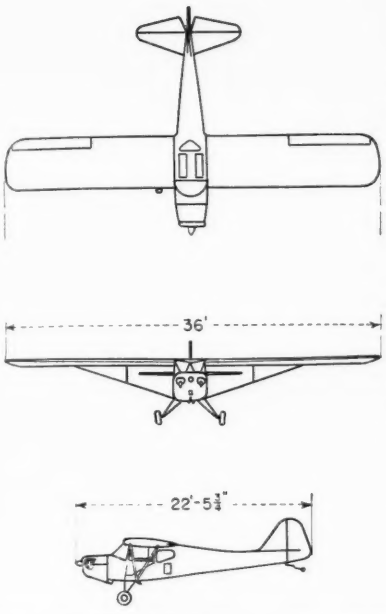
Swiss 4-6 placer was especially built for operating in mountainous territory and getting in and out of small fields. With 450-hp. P&W Wasp top speed is 143 mph., and cruising is 125 mph.

Fokker Partner

A two-seater powered by 85-hp. giving 112-mph. top speed, 93 cruising, and 350-mi. range. Gross weight is 1,545; empty is 1,040 lb. All-metal construction and fixed tricycle gear.

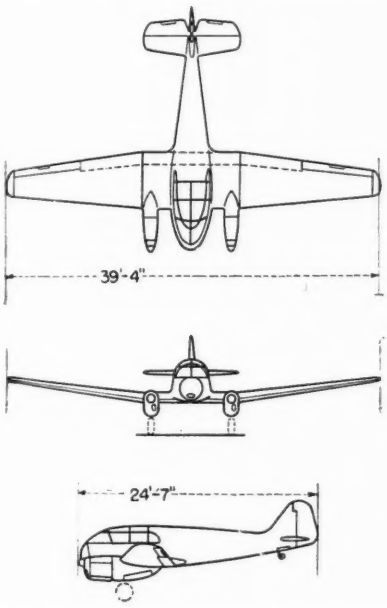






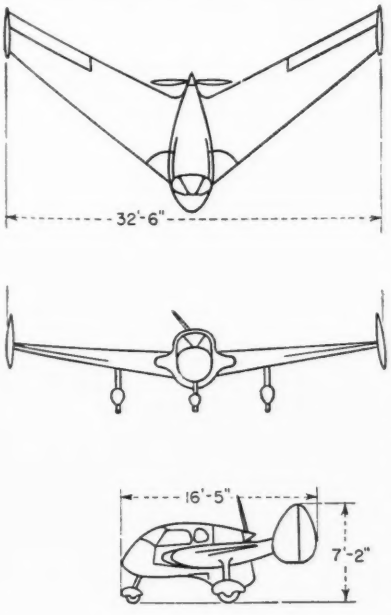
Auster Arrow

New British two-placer is postwar redesign of Auster liaison craft adapted from Taylorcrafts. Arrow is of fabric-covered wood-and-metal construction. Powered by 75-hp. Continental top speed is given as 100 mph., cruising 90, climb 490 fpm. Normal range 320 mi. Top weight is 1,400 lb., empty 912. Wing area 185 sq. ft. Service ceiling 10,000 ft. Takeoff distance in light wind is stated to be 140 yd., while landing run requires about 80 yd. Wing loading is 7.6 lb. Craft is available for export.



Aero 45

Seating four, this new twin-engine Czech craft is powered by two 105-hp. Walter Minors. Top speed is 175 mph., cruising 153, and stalling 53. Range with 48 gal. is said to be 625 mi. Climb is 781 fpm., and service ceiling 15,430 ft. Gross weight 3,065 lb., empty is 1,962 lb. Wing area 172.2 sq. ft. Construction is all-metal including covering. Props are adjustable pitch on ground, but variable-pitch airscrews may be fitted as optional. Luggage capacity is 99 lb.

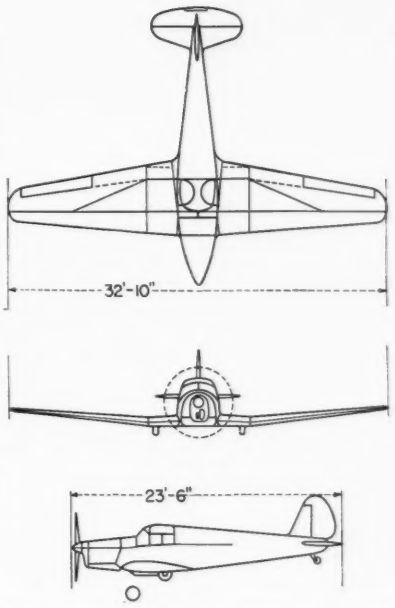


SE-2100

Unique French two-placer has 140-hp. Renault power plant, and is credited with top speed of 143 mph., and cruise of 124 mph. Range on 31.7 gal. given as 840 mi. Wing area 162.6 sq. ft., gross weight 1260 lb., empty 1,102 lb. Construction is entirely of metal including covering, and landing gear is fixed tricycle. Fixed leading edge slots; prop is two-blade fixed pitch pusher type airscrew. Leading edges near doors are integral with doors, so break away from wing when doors are opened.

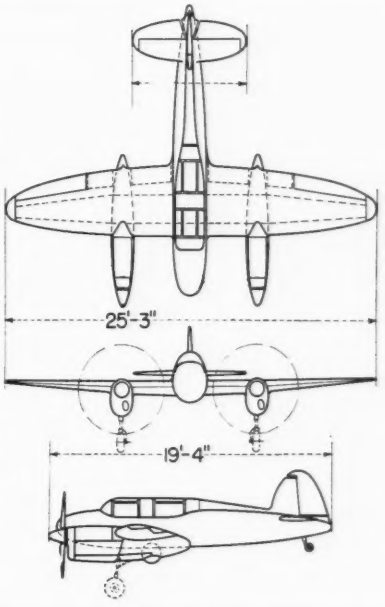
Mraz Sokol

Two-place low-wing Czech personal craft has retractable main gear, and, powered by 105-hp. Walter Minor, has 150-mph. top speed, 134 cruising, and stalling of 38. Climb 656 fpm., and service ceiling 16,400 ft. Gross weight 1,654 lb., and empty 882 lb. Wing area 129.1 sq. ft. Wing loading 12.8 lb., while power loading is 15.6 lb. Construction entirely of wood, with plywood covering. Fuel capacity is given as 26.2 gal., and range as 625 mi. Takeoff run 153 yd., landing run 98 yd.



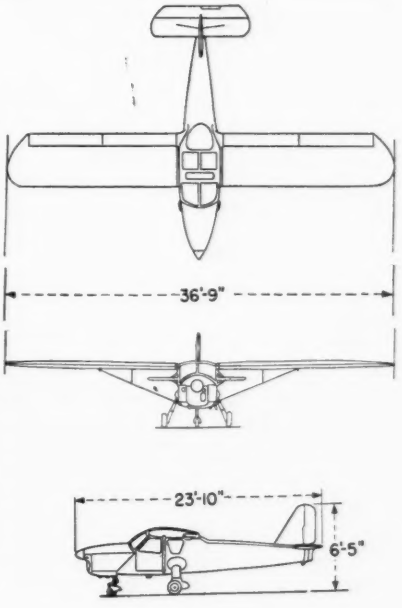
Hodek HK-101

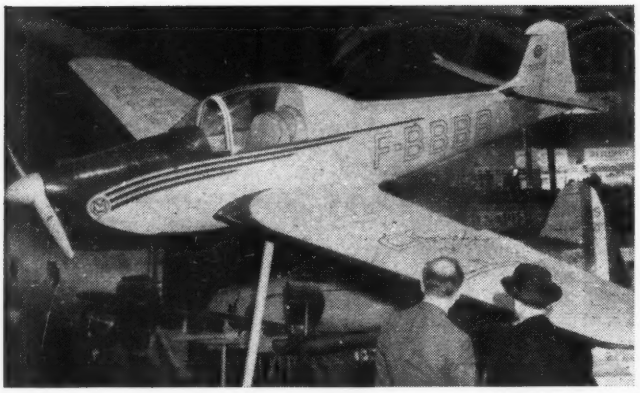
Small Czech two-seater is powered by two Walter Minors of 105 hp. each. Top speed 219 mph., cruising 187, and stalling 68. With 92.5 sq ft. of wing area, wing loading is 19.6 lb., and power loading 8.5 lb. Gross weight 1,818 lb., and empty 1,102 lb. Construction all-metal, conventional retractable gear. Takeoff run is stated to be 153 yd., landing run 382 yd. Climb given as 1,100 fpm., and service ceiling as 24,272 ft. Range is said to be 562 mi.



NC-840

Neat little 3-4 place French personal craft has 175-hp. Renault and does 137 mph. tops, cruises at 118, and lands at 37. Normal range is said to be 500 mi. Gross weight 2,320, and empty 1,241. Wing area is 212 sq. ft. Takeoff run takes about 130 yd. Landing gear fixed tricycle and construction all-metal with fabric covering. Craft has been especially designed for low-cost production, simplification of structures being done to a large extent. Wings and tail are strut braced.





Morane-Saulnier MS-560

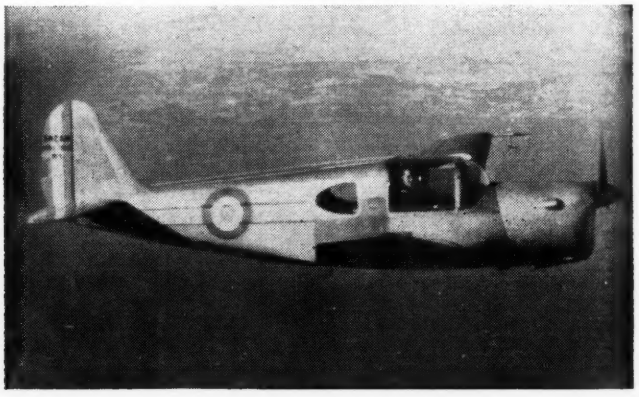
French single-seater is powered by a Train 6D-01 engine of 75 hp. Claimed is top speed of 147 mph., cruising 131, and landing of 50. Range is stated to be 621 mi., climb 875 fpm., and service ceiling 16,400 ft. Gross weight is 1,242 lb., empty is 767 lb. Wing area is given as 127 sq. ft. Construction is entirely of metal, and a retractable tricycle gear is utilized.

Morane-Saulnier MS-571

Powered by a 140-hp. Renault 4P.01, this 3-4 place craft is stated to have top speed of 155 mph., and to cruise at 137 mph., while stalling speed is 50. Service ceiling is 15,700 ft., and range is 621 mi. Wing area amounts to 172 sq. ft., gross weight is 1,277 lb., and empty weight is 836 lb. Craft is fabricated entirely of metal and has a retractable tricycle gear.

Nord 1201

Very similar to model 1203, possibly an earlier development, 1201 is stated to have top speed of 160.2 mph., cruising speed of 142.8, and landing speed of 46.5 mph. Range is given as 496.8 mi. Gross weight is 1,925 lb., and empty weight 1,225 lb. Construction all-metal including covering. Noteworthy is use of skid strips beneath fuselage to lessen damage in event of wheels-up landing.



Nord 1203 Norecrin

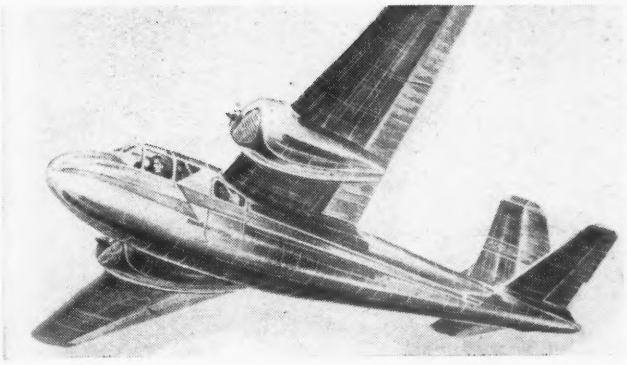
New French 3-4 place low-wing craft is powered by 140-hp. Regnier engine, stated to give top speed of 165 mph., and cruising speed of 145 mph. Maximum weight is 1,930 lb., and empty is 1,020 lb. Wing area is given as 140 sq. ft. Retractable tricycle landing gear and all-metal construction including covering. Prop is fixed pitch. Dual controls are standard equipment.

Companhia Aeronautica Paulista CAP-4

Of several designs turned out by Brazilian concern, craft shown is stated to be most popular. A tandem two-placer powered by 65-hp. Continental, top speed is given as 90 mph., and cruising as 80 mph. Span is 34 ft. 1⅝ in. and wing area 117 sq. ft. Fully loaded weight 1,200 lb. Production of Paulistinha, as craft is named, runs about 10 weekly.

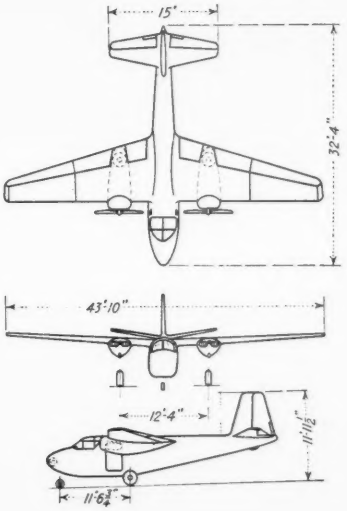
SE 2310

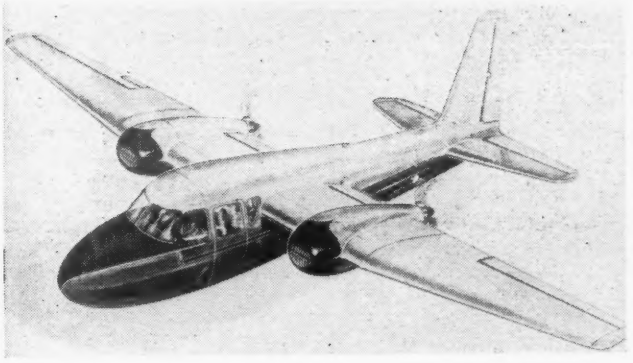
Four-seater French craft is powered by an in-line four-cylinder 4 PEI Renault aircooled engine of 140 hp., giving this plane an estimated top speed of 135 mph., and cruising speed of over 115 mph., while range is about 700 mi. Construction is all-metal, including covering, and landing gear, of tricycle type, is not retractable. Wings have fixed slots near leading edges.



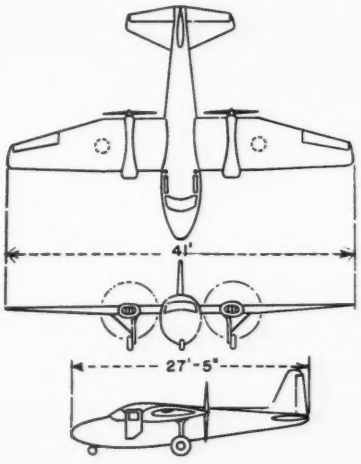
Aero Commander

Six-place craft designed for executive, charter and small feederline operations, it is powered by two 200-hp. Lycomings slated to give high speed of 181 mph. and cruising speed of 165 at sea level. With 100-gal. fuel capacity, normal range is 700 mi. Gross weight is 4,200 lb., weight empty is 2,400 lb., resulting in wing loading of 17.3 and power loading of 10.3. Construction is all-metal, fuselage being of semi-monocoque design. Craft is fitted with retractable gear.





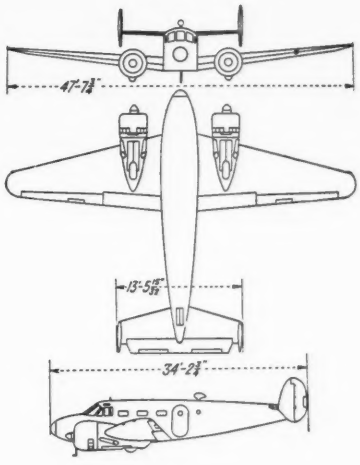
Baumann Aircraft Corp. Brigadier

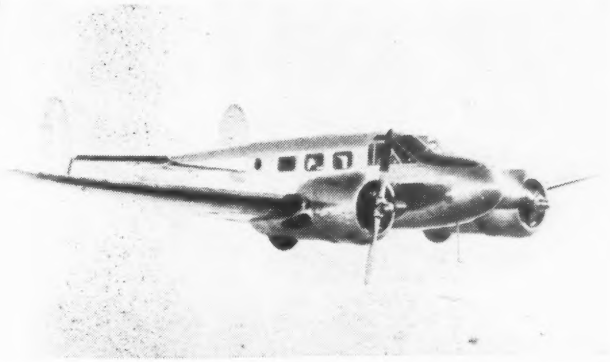


A 4-5 place executive type expected to sell under $10,000 on the basis of production of 100 or more units per year. Prototype, scheduled for test flights soon, is powered by two 125-hp. Continentals, design calling for high speed of 170 mph., cruising speed of 150. and landing speed of 57 mph. Rear seat is 150 in. wide, that of standard automobile sedan seat. Pusher propeller installation designed for safety and quieter operation.

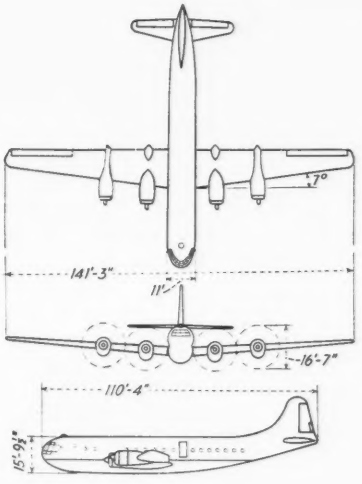
Beech D18S

Widely used executive, charter and regional airline craft having high speed of 230 hp. at 5,000 ft., and cruising speed of 211 at 10,000 ft. Powered by two P & W Wasp Jrs. of 450 hp. each it has initial climb of 1,250 fpm. and, with 286-gal. fuel capacity, range of 910 mi. Takeoff run to clear 50-ft. obstacle is 1,650 ft., landing distance over 50-ft. obstacle to full stop at sea level is 1,390 ft. With crew of two, passenger load varies from five to seven.





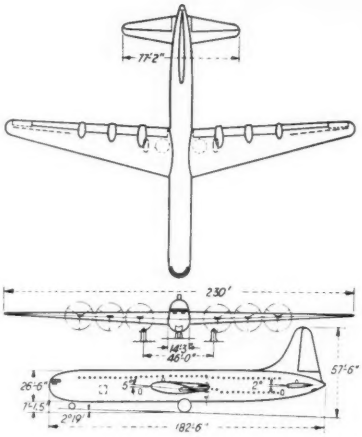
Boeing 377 Stratocruiser

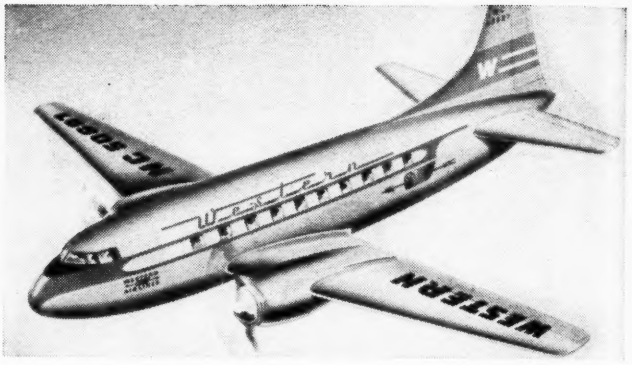


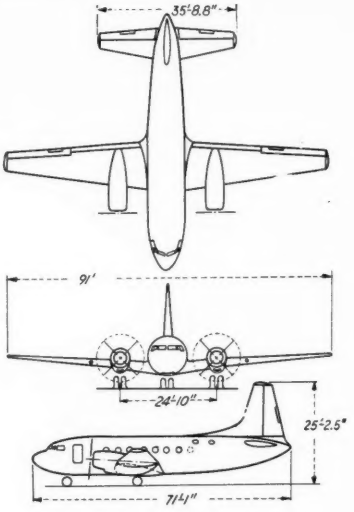
Developed from AAF C-97 troop-cargo carrier, civil versions will be delivered to transoceanic airlines early this Spring. With up to 100 passengers it will have range of approximately 3,500 mi. as fuel capacity is 7,055 gal. Powered by four P&W R-4360 Wasp Majors, high speed is over 400 mph., cruising 340 at 23,500 ft. Pressurized cabin and supercharging give service ceiling of 30,000 ft. Double deck permits movement of large cargo loads.

Consolidated Vultee CV-37

Being developed from XB-36 and XC-99, it is largest transport under way. Slated to carry 204 passengers by day, or about half that number in sleeper version, it will require six 5,000-hp. engines —possibly Lycoming R-7755 reciprocating engines or, if available, turboprops of comparable power output. Design gross weight 320,000 lb., empty 164,100., wing area 4,772 sq. ft., wing loading 67 lb. sq. ft. Design high speed is 370 mph.





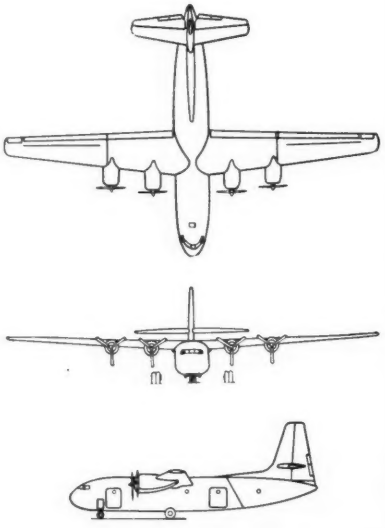


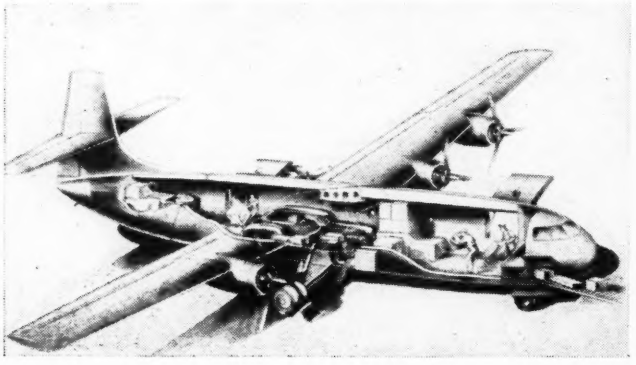
Consolidated Vultee 240

New 40 - passenger transport soon to go in service with many domestic carriers. Production slated to reach one a day by May. First passenger craft to be designed for jet exhaust assist, this speed-adding feature being made possible by special engine nacelles. Powered by two 2,400-hp. P&W R-2800-CA-18s it will have top speed of 336 mph. at 13,500 ft., cruising speed of 300 at 16,000 ft. Takeoff run at 39,500 lb. will be 3,800 ft.

Curtiss-Wright CW-32

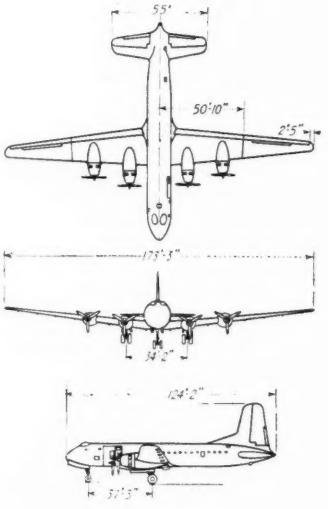
Now in engineering stage, with prototype scheduled for completion early next year, this cargo carrier is designed to offer direct operating costs of less than 5c per ton-mi. To be powered by four turbo - supercharged R-1820 Wrights of 1,450 hp. each, it will have maximum cruising speed of 270 mph. at 25,000 ft. and will carry 25,000 lb. of cargo 1,500 mi., or 20,000 lb. 2,500 mi. Reversible Curtiss propellers will be used.





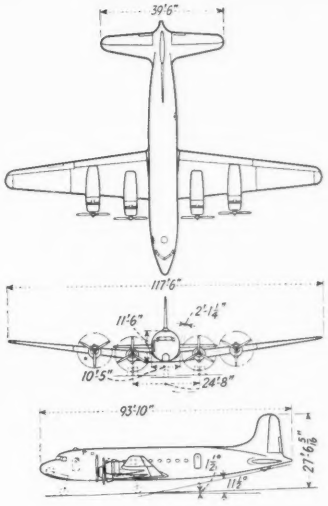
Douglas C-74 Globemaster

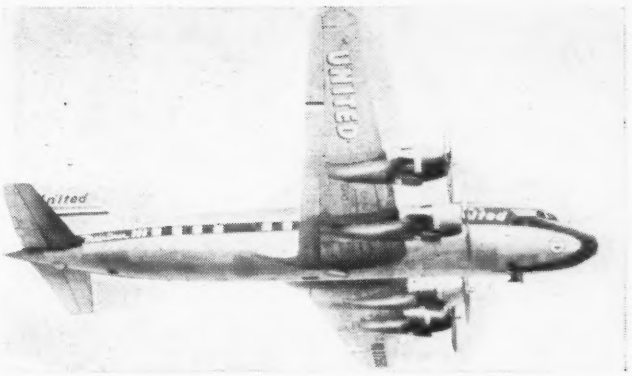
Created for long range airborne army work, it can transport up to 118 troops or sizable loads of ground armament. Built-in. elevator and cranes speed loading and unloading operations. Powered by four P&W R-4360 Wasp Major engines developing 3,500 hp. each at sea level. C-74 has high speed of over 300 mph., cruising speed of about 275 mph,. and 11,000-gal. fuel capacity gives range of over 4,000 mi. Gross weight 162,000 lb.

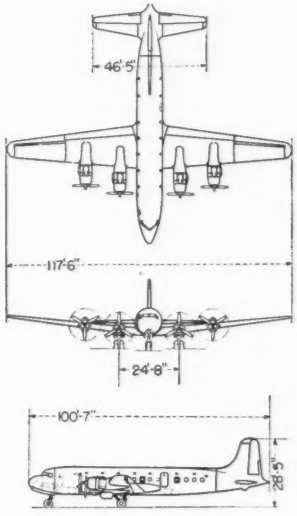


Douglas DC-4

Widely used in both domestic and transoceanic service, airlines have adapted it to carry from 48 to 58 during World War II, it is also used by both scheduled and nonscheduled carriers in cargo service. Powered by four 1,450-hp. P&W R-2000s turning Hamilton Standard propellers, it has high speed of 270 mph. at 11,000 ft., cruising speed of 234 at 22,900, maximum range of 4,240 mi., service ceiling of 24,000 ft.





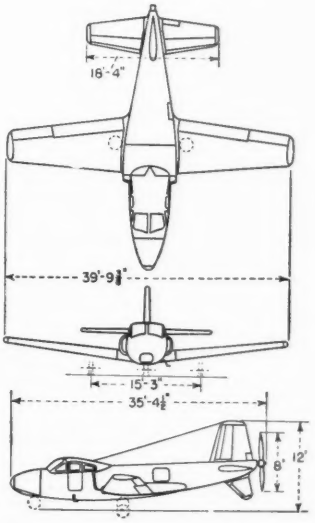


Douglas DC-6

Developed from the DC-4 its principal differences are in power plant—2,100-hp. P&W R-2800s, and length, 100 ft. 7 in. against 93 ft. 5 in.—the DC-6 is also faster, having a high speed of 342 ft. at 20,000 ft., cruising speed of 300 at 23,800, and initial climb of 1,265 fpm. Normal range of the craft is 2,577 mi., and day seating capacity can be varied from 52 to 68. Domestic airlines are now taking delivery on sleeper versions fitted with 26 berths.

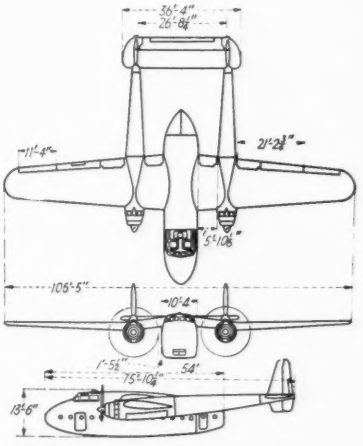
Douglas Cloudster

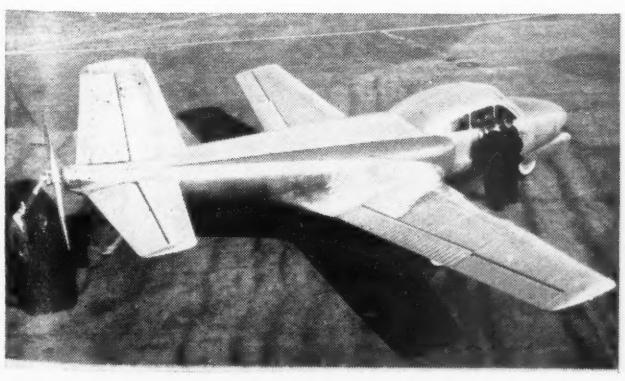
Recently - announced executive type craft featuring buried engines driving propeller mounted aft of empennage, as was done with company's XB-42 bomber (see AVIATION, Feb., p. 37). A five-place plane, it has two 250-hp. Continental engines within fuselage aft of passenger cabin, driving, through extension shaft, an 8-ft. Hamilton Standard propeller. Either engine may be cut in or out without affecting directional flight control.

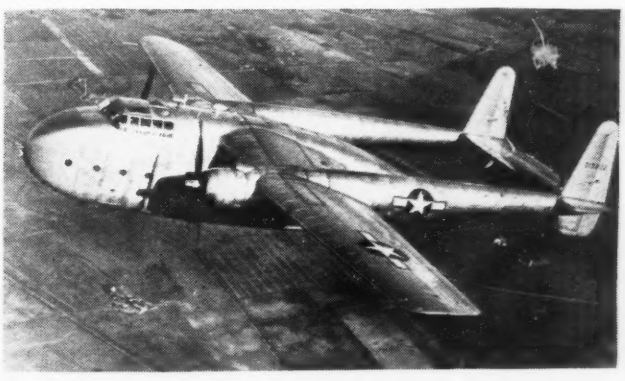


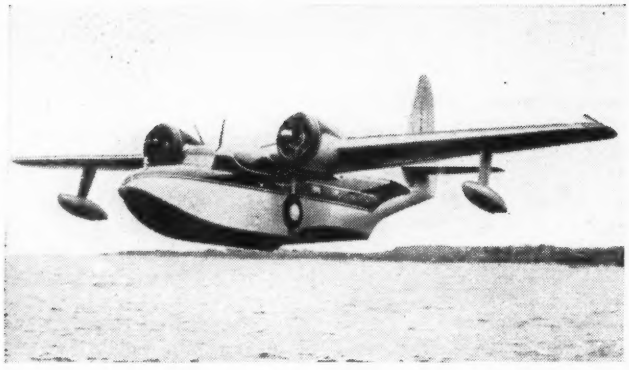
Fairchild C-82 Packet

Currently being delivered to AAF as workhorse troop and cargo carrier, its unusually-shaped fuselage with space about equal to that of railroad freight car makes it adaptable to wide variety of tasks. Powered by two 2,100-hp. P&W R-2800s it has high speed of 244 mph. at 17,500 ft., cruising speed of 200 at 10,000 ft., service ceiling of 25,000 ft., range of 4,300 mi., and initial climb of 800 fpm. (For Design Analysis, see Aviation for Aug. and Sept., 1945.)



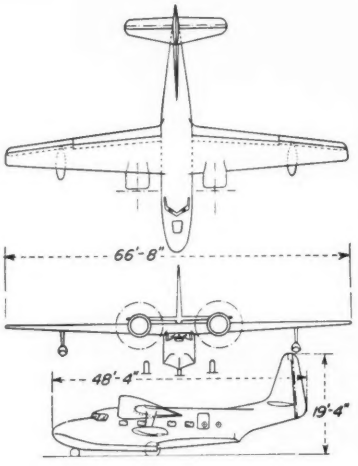






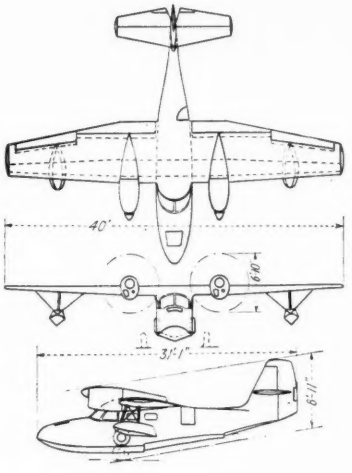
Grumman Mallard

New 8-10 passenger amphibian certificated under CAA's rigid Air Transport category on which deliveries are being made to both airline and individual owners. Powered by two 600-hp. Pratt & Whitney Wasps, its high speed is 205 mph. at sea level, initial rate of climb is 1,650 fpm., service ceiling is 24,650 ft. and range varies up to 695 mi. on 330-gal. fuel capacity. Basic price is $115,000, with final costs determined by equipment desired.



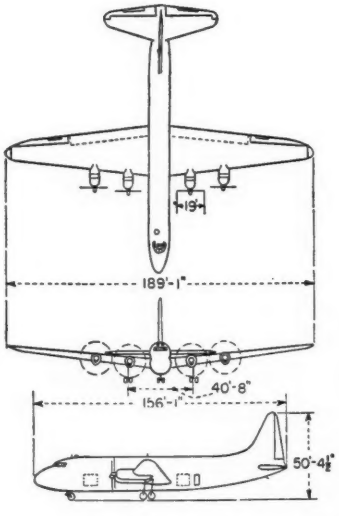
Grumman Widgeon

Widely used by Navy throughout World War II as utility craft, postwar models are being delivered throughout the world. A 4 to 5-place amphibian powered by two 200-hp. 6-cylinder Ranger engines, Widgeon has a top speed of 164 mph. at sea level, cruising speed of 150 mph., initial rate of climb of 1,000 fpm., landing speed of 58 mph., service ceiling of 15,500 ft. and range of 775 mi. Price is approximately $25,000 depending on radio and other equipment.



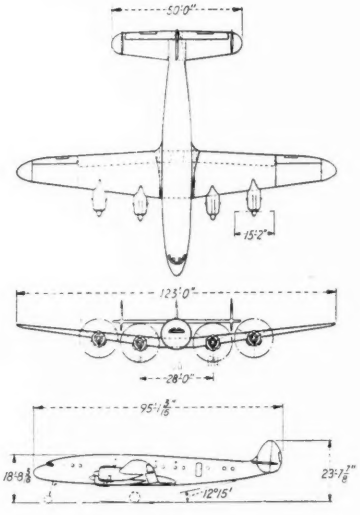
Lockheed Constitution

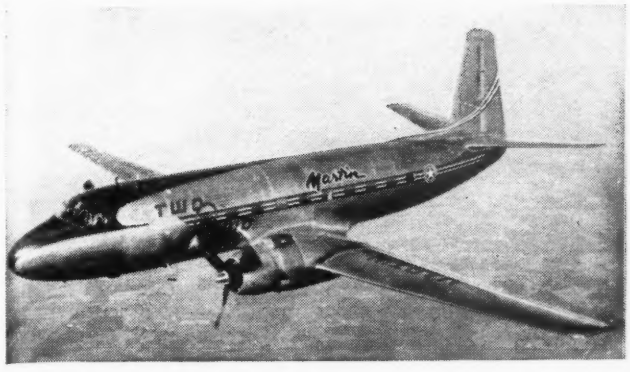
Despite the fact it is one of the largest craft undertaken in this country—with a gross wt. of 184,000 lb.—its takeoff run at top weight in still air is but 2,350 ft. and it can be brought to a stop in only 2,300 ft. after landing over a 50-ft. obstacle. Two of the type are being delivered to the Navy for long range transport work. With four 3,000-hp. P&W R-4360s, high speed is 303 mph. at 20,000 ft., and cruising speed is 286 ft. at 25,000.



Lockheed Constellation

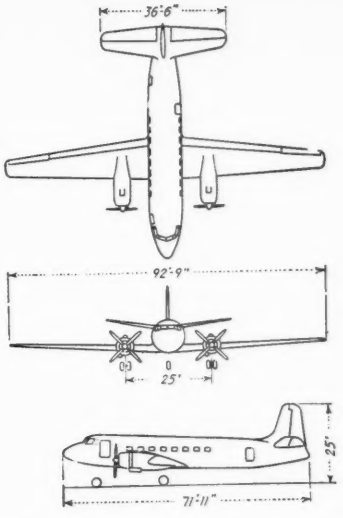
Holder of many transport speed records, it is used by many foreign as well as U. S. lines for both domestic and international service. New models now coming off production lines feature sleeping facilities and new means of cabin "suspension" for soundproofing and vibration damping. Maximum capacity for day flights is 67 passengers and range is over 3,000 mi. With four 2,500-hp. R-3350 Wrights, high speed is 357 mph. at 19,500 ft.





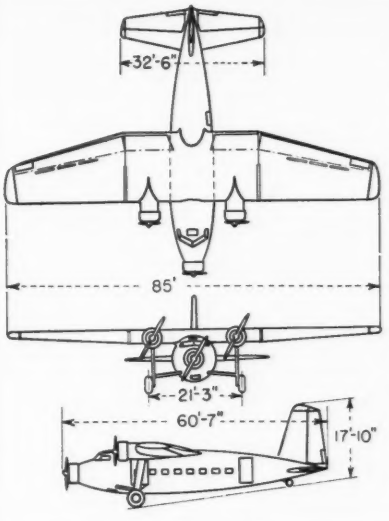
Martin 202

Orders for nearly 400 of the type have speeded production, with initial deliveries scheduled for this Spring. Designed as a 40-passenger domestic carrier, its two 2,100-hp. P&W R-2800's give it top speed of 296 mph. at 7,300 ft., cruising speed of 263 at 10,000 and initial climb of 1,425 fpm. Range is 1,030 mi., and service ceiling is 29,000 ft. A pressurized cabin version known as the 303 is under way and United Air Lines has ordered a turbo-prop cargo version.



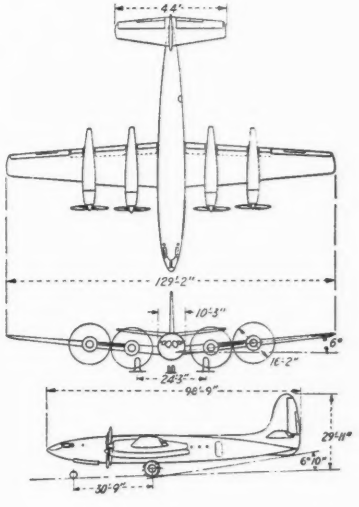
Northrop Pioneer

Designed to get heavy loads out of small, unimproved fields, this is the first trimotor airliner built in this country in well over a decade. Takeoff run with a 10,600-lb. useful load is but 700 ft., landing run is only 750 ft. with same load. Production models will be powered by three 800-hp. Wrights, giving high speed of 185 mph. at 10,000 ft. A 1,000-gal. fuel capacity gives range of 1,750 mi. Large door at truck-bed height facilitates loading.



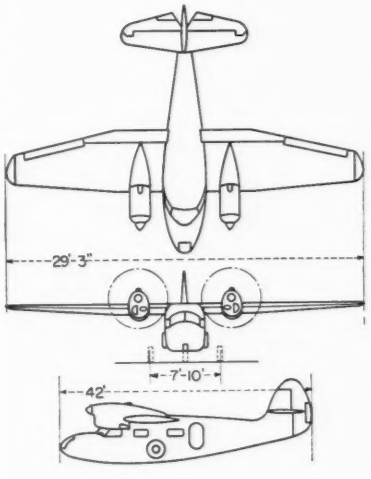
Republic Rainbow

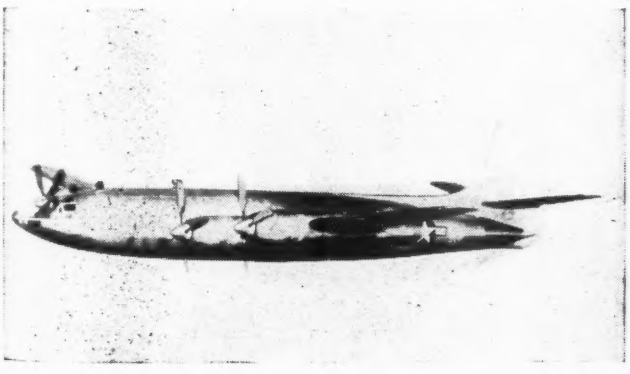
Commercial version of long range high altitude XF-12 reconnaissance plane, Rainbow has been ordered by American and Pan Am for transocean and transcontinental luxury trade. With seating capacity of 46, it is designed for high speed of 450 mph. at 40,000 ft., and cruising speed of over 400 at same altitude. Takeoff distance over a 50-ft. obstacle is 5,250 ft., landing run over same height is 6,680. Power plants are four 3,500-hp. P&W Wasp Majors.

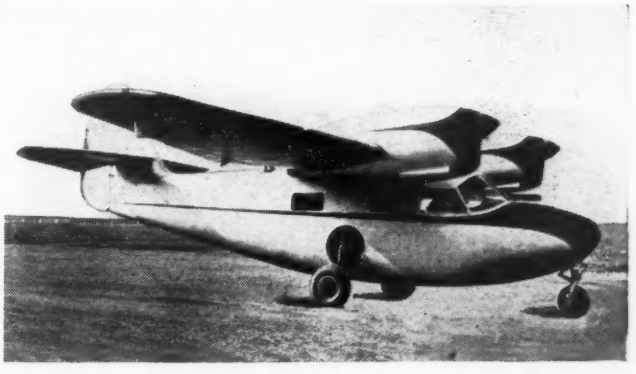


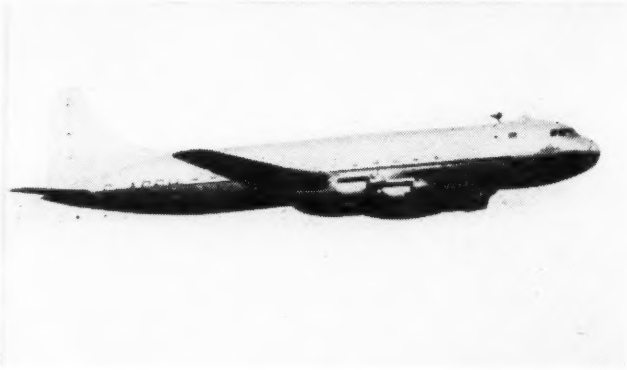
Southern Aircraft Southernaire

A six-place executive type designed for a high speed of 202 mph. at sea level, cruising speed of 175 at 65% of power and maximum cruising range of over 1,500 mi. Gross weight 5,000 lb., empty weight 3,100 lb. Prototype is powered by two 200-hp. Rangers, but production models are to have 270-hp. Continentals. Standard equipment includes altitude and directional gyros, turn and bank indicator, magnetic compass and sensitive altimeter.



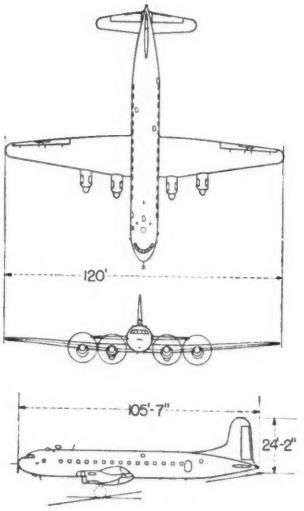


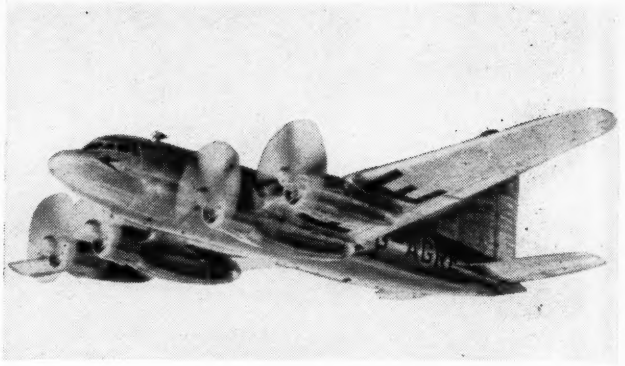


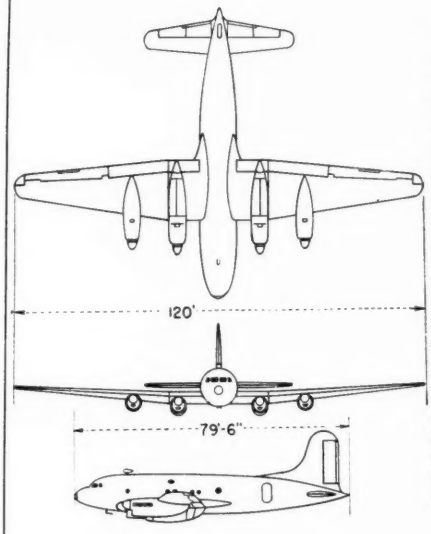


Avro Tudor II

Enlarged version of Tudor I also has four 1,770-hp. Merlins but carries 40-60 passengers in pressurized cabin. Top speed is given as 330-mph., cruising 285, and service ceiling is 28,600 ft. Gross weight is 80,000 lb., and empty is 46,300 lb. As a cargo carrier, there's room for nine tons of freight, which can be carried 1,100 mi. at 200 mph. at 10,000 ft. Fuselage is 11 ft. in diameter and has useful volume of 4,020 sq. ft.





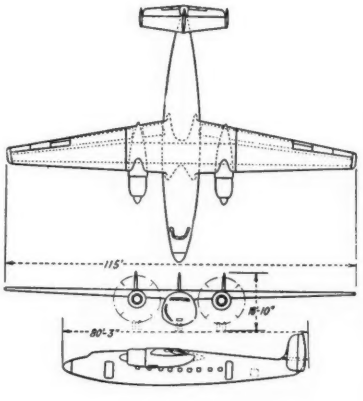


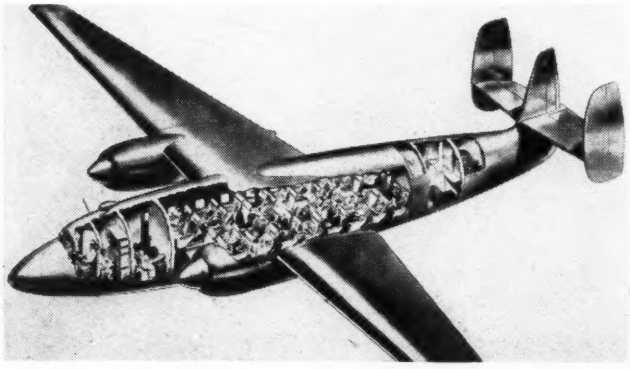
Avro Tudor I

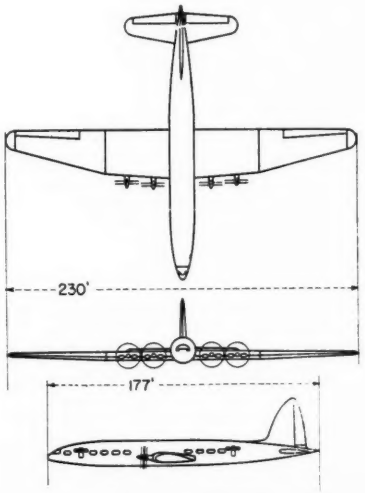
Powered by 4 Rolls-Royce Merlins at 1,770 hp. each, this 12-24 passenger craft is designed for long range hauls, primarily over North Atlantic. Of all-metal construction, craft has 346-mph. top speed, 300-mph. cruising, and climb of 880 fpm. Gross weight is 88,000 lb., and empty is 43,690 lb. Service ceiling is 28,000 ft. Fuel capacity is given as 3,300 gal. New tail surfaces, of greater area, have been fitted to later models.

Airspeed Ambassador

New high-speed transport under construction will seat 28-50 passengers and have 355-mph. top speed on two 3,000-hp. Bristol Centaurus engines. Of all-metal fabrication, and with retractable tricycle gear, craft will have 1-2,000-mi. range, service ceiling of 32,000 ft., and estimated 1,250-fpm. climb. Gross weight is to be 45,000 lb., with empty at 31,320 lb. Approximately 600 gal. of fuel will be carried, also 9,400-lb. payload.

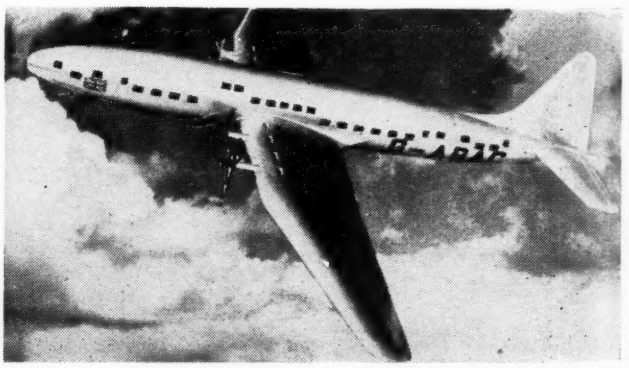






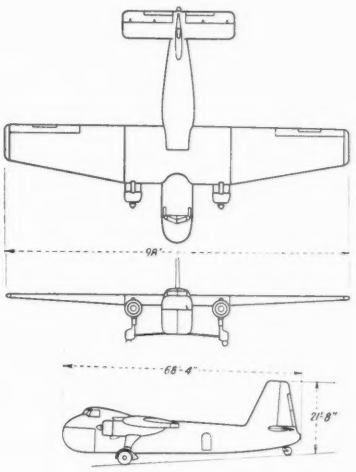
Bristol Brabazon I

Britain's biggest airliner now under construction, this 180-seater is to be powered by eight Bristol Centaurus of 2,500 hp. each, grouped in pairs driving 4 props. A later model is to be fitted with Bristol Theseus propjets. First plane is to have top speed of over 300 mph., and cruise at over 250. Wing area will total 5,317 sq.ft., and gross weight is to be 279,000 lb. Its retractable tricycle landing gear will make craft stand 52 ft. high.



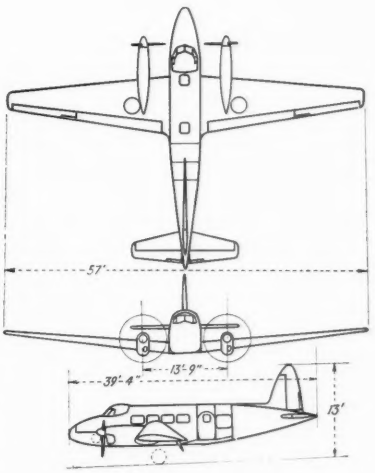
Bristol Freighter

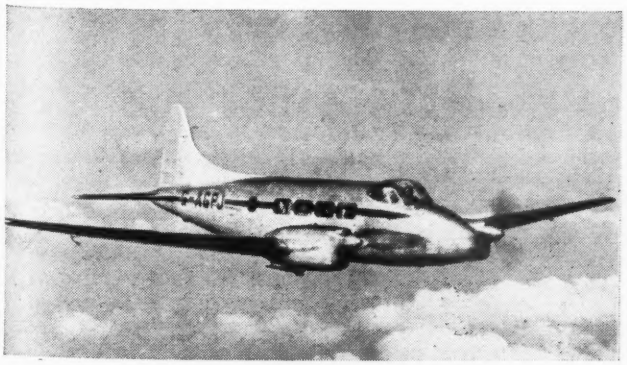
Designed to be a low-cost cargo hauler capable of operating in and out of rough fields, this craft is powered by two 1,798-hp. Bristol Hercules turning Rotol props and has a range of 1,000 mi. on 600 gal. Top speed is 240 mph. at 5,000 ft. and landing speed is 73 mph. Gross weight is 37,000 lb., and empty weight 25,616 lb. Wing loading is 26 lb. sq. ft. Loading is done through clamshell type nose doors. Construction is all-metal.

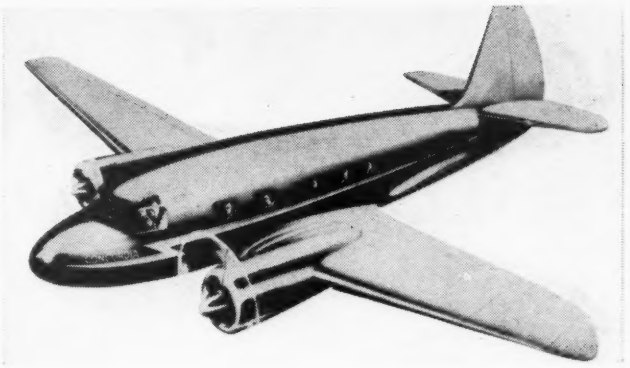


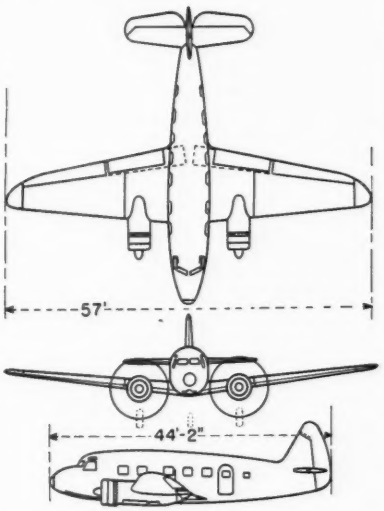
DH Dove

Small 8-11 place feederliner is an all-DH product, having 330-hp. DH Gipsy engines turning three-blade DH reversible pitch props. Top speed is 222 mph., cruising 200, and stalling speed is 72 mph. Range is 500 mi. on 79 gal. Of all-metal construction, with retractable tricycle landing gear, gross weight is 8,500 lb., empty 5,555 lb. Climb is 625 fpm. Takeoff to clear 50-ft. obstacle takes 770 yd., landing 750 yd. Craft has been planned for inexpensive maintenance.



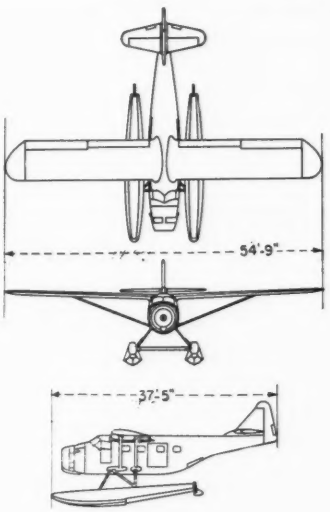






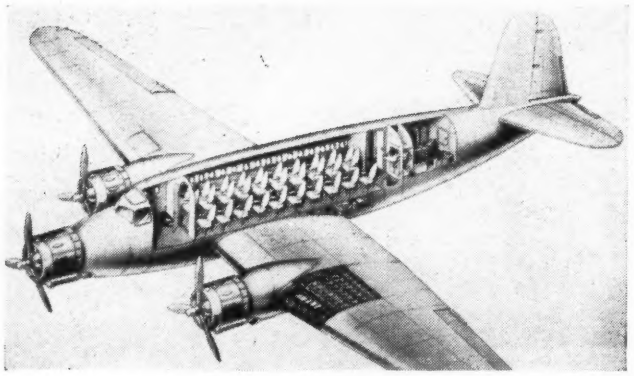
Cunliffe-Owen Concordia

Proposed new feederliner is to carry 10-12 passengers at top speed of 223 mph. Cruising speed is to be 214 and stalling 67. Two Alvis Leonides of 525 hp. each will be fitted. Landing gear will be retractable tricycle. Gross weight is to be 11,000 lb. and empty 7,116 lb. Construction is to be all-metal. A takeoff to clear a 50-ft. obstacle is planned at 574 yd., and climb on one engine is estimated at 360 fpm. Wing loading is given as 25.3 lb.



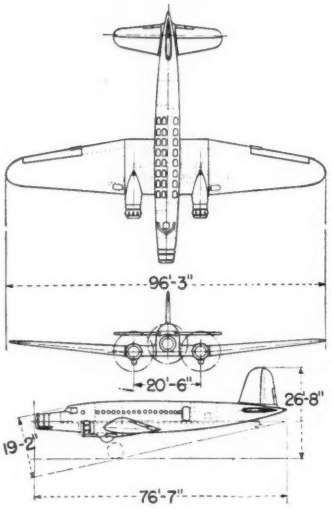
Fairchild Husky

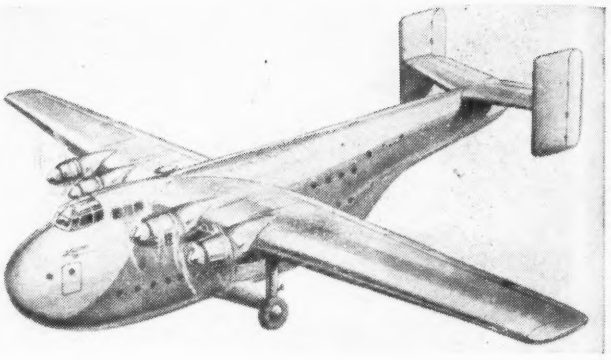
New Canadian freighter, powered by 450-hp. P & W Wasp can be fitted with either skis, floats or tricycle landing gear. Top speed is given as 138 mph., cruising 121 and stalling 58. Range is 500 mi. Gross weight is 6,400 lb., empty is 4,200. Construction is all-metal. Useful load is about 2,200 lb. Up to eight passengers can be carried on folding benches. Loading is done through hatch under rear of fuselage, which has approximately 250 cu. ft. volume.

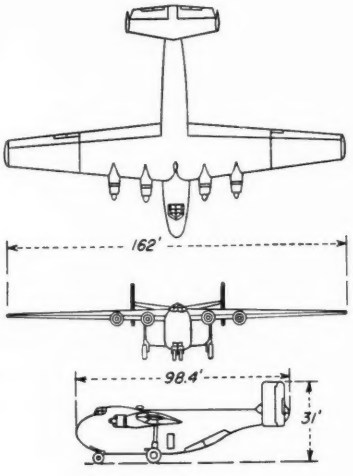


FIAT G.212

One of first Italian craft built under provisions of peace treaty allowing that country to engage in limited aviation activities. Seating up to 40, and powered by three P&W R-1830s, a top speed of 232 at 8,200 ft. is claimed. Gross weight is given as 38,280 lb., empty as 22,880 lb. Ceiling is 22,468 ft., while it is said that with one engine out a height of 13,776 ft. can be maintained. Construction is all-metal, and landing gear is of conventional retractable type.





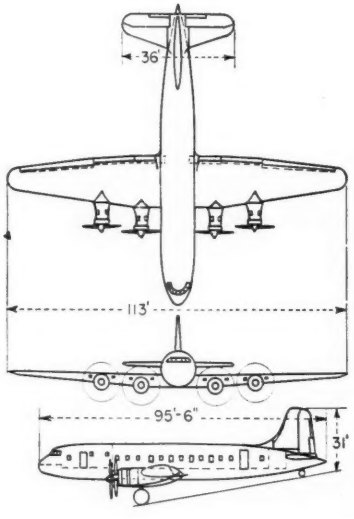


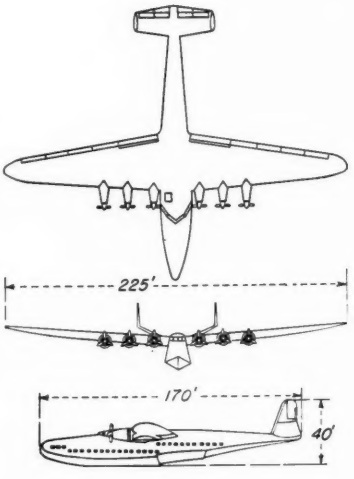
General Aircraft

Universal Transport is designed to carry maximum loads of freight or passengers and is to be powered by four 1,950-hp. Bristol Hercules, expected to give craft a top speed of about 250 mph. On 850 gal. of fuel, range is planned at 550 mi. Gross weight would be 87,300 lb. Cargo loading will be accomplished through an opening beneath rear of fuselage. Wing loading is to be 26-30 lb. sq. ft. Climb is to be 960 fpm.

Handley Page Hermes

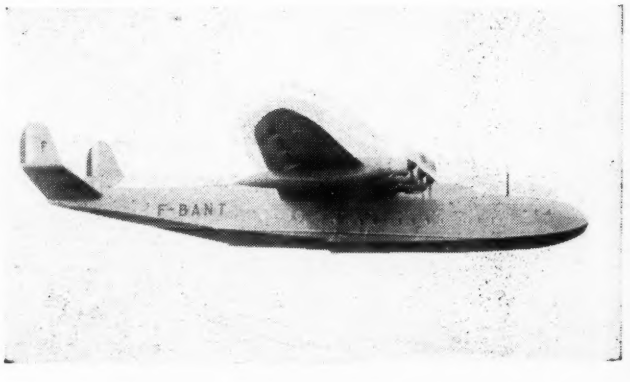
Various models of this new 34-64 place high-speed airliner are under way, some to have propjet power plants, others tricycle undercarriages. First craft is powered by 1,800-hp. Bristol Hercules, giving top speed of 337 and cruising speed of 284. Ceiling is said to be 25,300 ft., and range 3,460 mi. Pressurizing equipment will be fitted in production craft. Mark III, with Theseus propjets is planned for 355-mph. cruising speed.



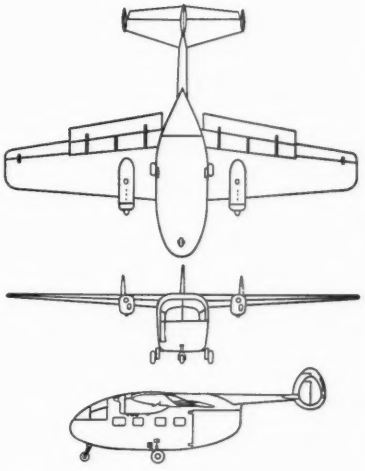


Latecoere 631

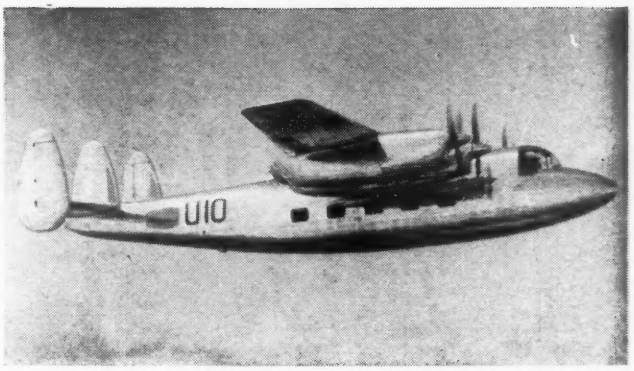
Similar in many particulars to SE-200, Late-631 also has 6 Wright Cyclones at 1,600 hp. each, giving this 80-seater a top speed of 250 mph., cruising of 200 mph., and range of 3,750 mi. Wing area is 3,445 and gross weight 158,950 lb. Empty weight is 71,090 lb. A crew of nine is normally carried. This craft has already made some flights across South Atlantic to Argentina and other Latin American countries. As a sleeper, 40 are carried.

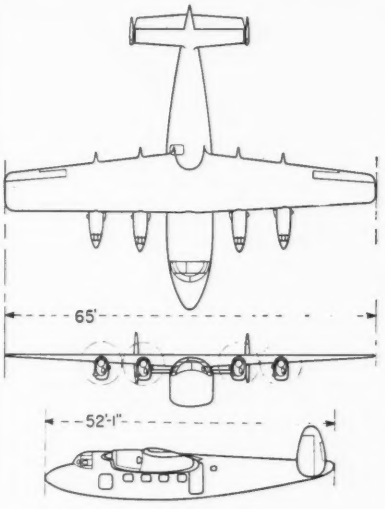


Miles Aerovan



Small all-wood passenger and cargo carrier is powered by 2 Blackburn Cirrus of 150 hp. each, giving 127-mph. top speed and 112 cruising. Normal range is 400 mi., and climb is 620 fpm. Tricycle landing gear is fixed. Noteworthy is use of Miles auxiliary airfoil flaps, also shape of fuselage. Top weight is 5,400 lb., while empty is 3,000. Takeoff run into light wind (5 mph.) takes 200 yd. Wing area is 390 sq. ft. Cargo loading is through fuselage rear.

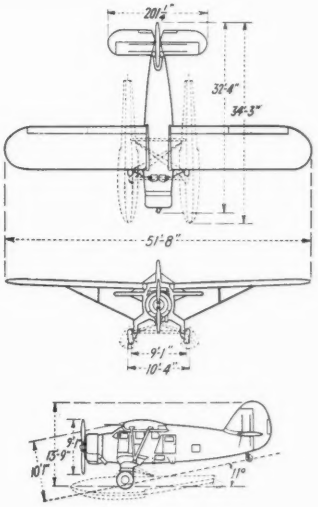




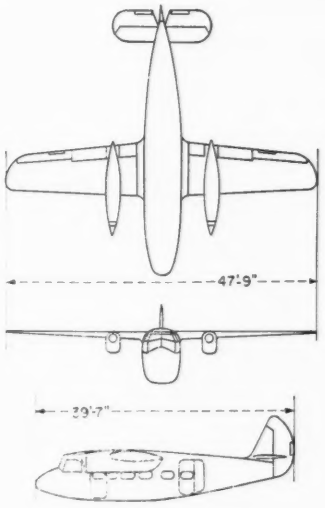
Miles Marathon

New 18-place medium range airliner is fitted with 4 DH Gipsy Queens at 330 hp. each, giving craft 230-mph. top speed, 210-mph. cruising, and 1,000-mi. range. All-metal construction is used, and craft also has retractable tricycle landing gear. This is first all-metal craft to be built by this concern. A later version is to be powered by A-S Mamba propjets, for use by British European Airways. Total cabin capacity is given as 774 cu. ft.

Noorduyn Norseman

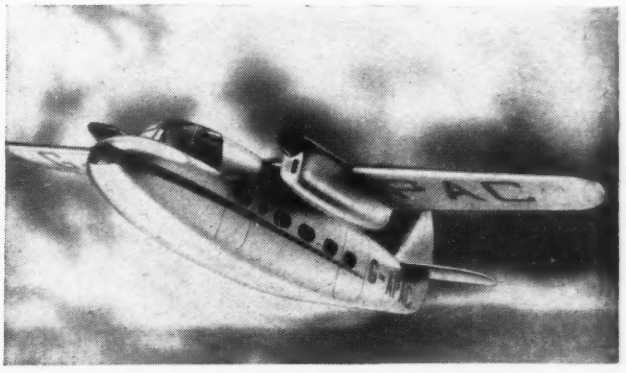


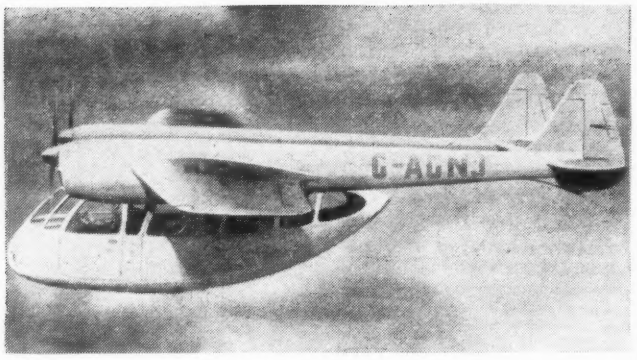
Powered by a 600-hp. Wasp, this small cargo plane has been designed to operate under rough conditions, and is readily adaptable to wheels, skis, or floats. Construction includes wood, welded steel tubing; while fabric is mainly used in covering. Cruising speed is given as 141 mph., landing speed 68 mph., and service ceiling 17,000 ft. Seaplane disposable load is 2,880 lb., landplane's is 3,160 lb. Up to 8 passengers can be carried, depending on cargo load.



Percival Merganser

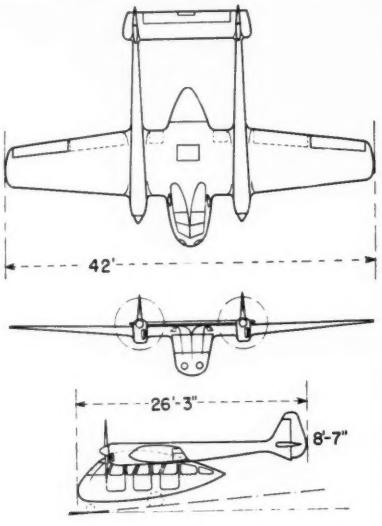
Powered by two 295-hp. DH Gipsy Queens, this 5-8 place transport has top speed of 193 mph., and cruises at 150 mph. Of all-metal construction and having a retractable tricycle gear, gross weight is 6,750 lb., and empty weight 4,590 lb. Rate of climb is 1,010 fpm., and service ceiling is 24,000 ft. Range is given as 830 mi. on 193 gal. Wing loading is 21 lb., and power loading is 11.35 lb. Takeoff over 50 ft. obstacle is 560 yd.

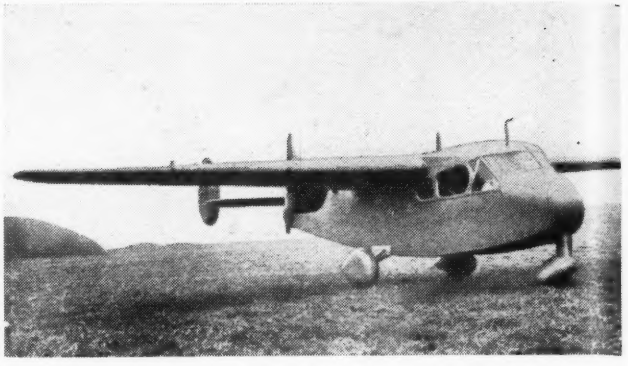




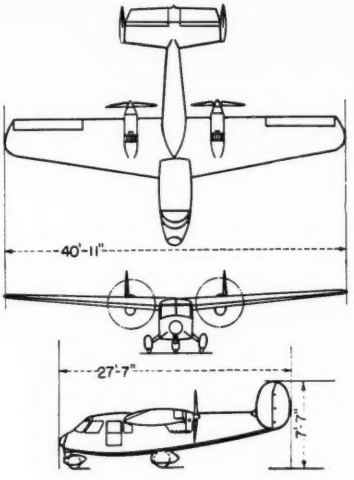
Portsmouth Aerocar

Now under construction, new transport is to be offered in three models, two seating 6, other five. Model Major is to be powered by two Blackburn Cirrus or DH Gipsy Major of 155 and 160 hp. each respectively, craft will have 167-mph. top speed, 153-mph. cruising speed, and 532-mi. range. Takeoff run to clear 50-ft. obstacle is estimated at 258 yd. Mixed metal and wood construction is to be used. Retractable tricycle landing gear will be fitted.





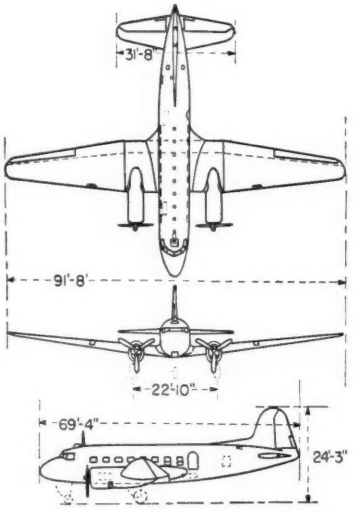
Praga E-210



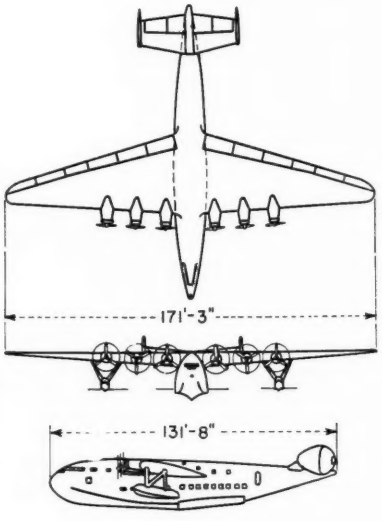
High-wing pusher transport developed by Czechs seats 4-5 and is powered by two 105-hp. Walter Minor engines giving 143-mph. top speed, 125-mph. cruising, and 53-mph. stalling speed. Top weight being 2,975 lb., and empty at 2,182, cruising range is given as 500 mi. Wing loading is 13.36 lb. Construction is mixed, wood being used in wings, including covering, while fuselage is welded steel tubing, fabric covered. Landing gear is fixed tricycle.

Saab Scandia

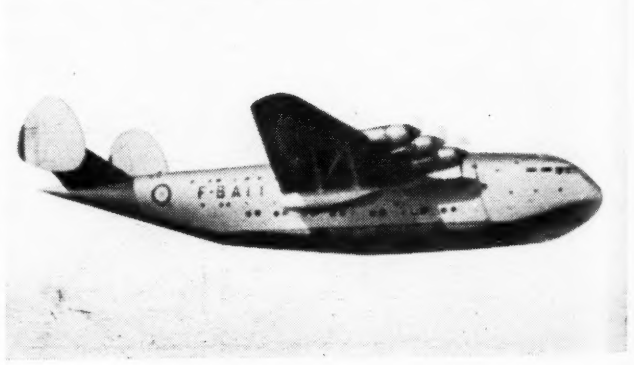
New Swedish airliner, which has recently started test flights, has been designed to meet U. S. ATA requirments. Powered by two P&W Twin Wasps of 1,450 hp. each, craft can seat 24-32, and is said to have 251-mph. top speed, 222-mph. cruising, and 75-mph. landing speed. Construction is all-metal and a retractable tricycle gear is fitted, as is thermal anti-icing. Normal range is set at 1,100 mi. Climb is given as 1,200 fpm.

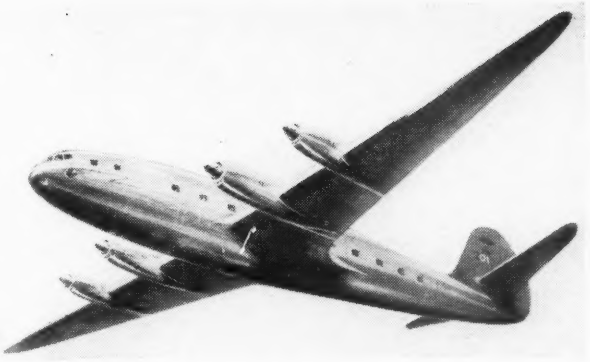


SE-200



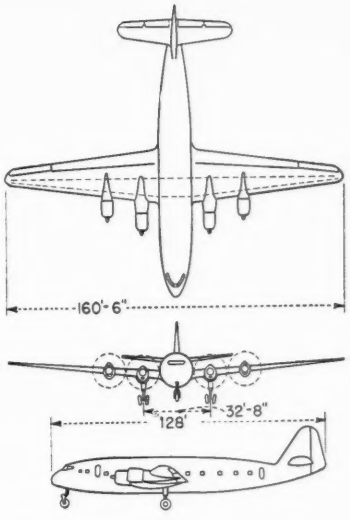
Giant French flying boat seats 40-80 and is powered by 6 Wright R-2600s of 1,600 hp. each. Range is 3,760 mi., and top speed as 235 mph., while cruising is placed at 195. Having a gross wing area of 3445 sq. ft., craft weighs 158,731 lb. loaded, and 72,191 empty. Crew totals 8. It has been built primarily for North Atlantic operations. Prototype was designed in 1942. Construction is entirely of metal. Note typically French tail assembly.

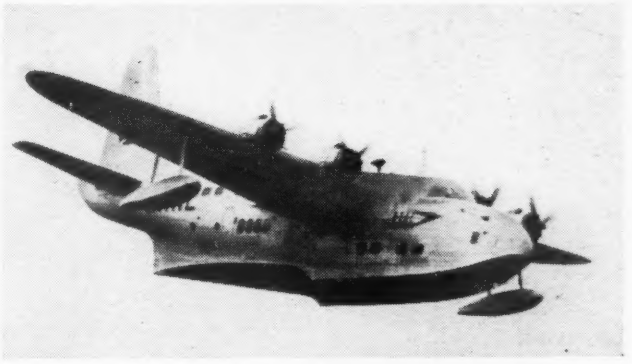




S.E. 2010

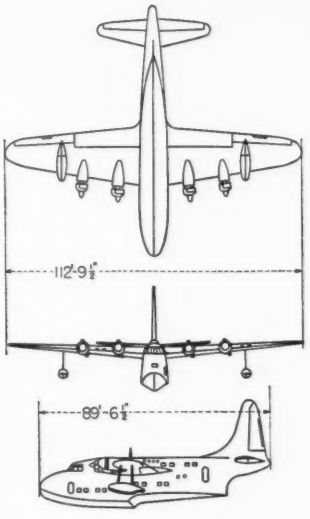
French plan this craft as a replacement for Air France's Constellations and DC-4s by end of next year. To be powered by 4 P&W Wasp Major R-4360s, and carrying 60-108 passengers, top speed is estimated at 354, and range at 2,485 mi. Tricycle gear is specified for this new all-metal craft, for which an order of 25 has been placed. Gross weight of 2,500 mi. is aimed at 67 tons. For long hops, cabin would be divided into 20 compartments, with central kitchen.





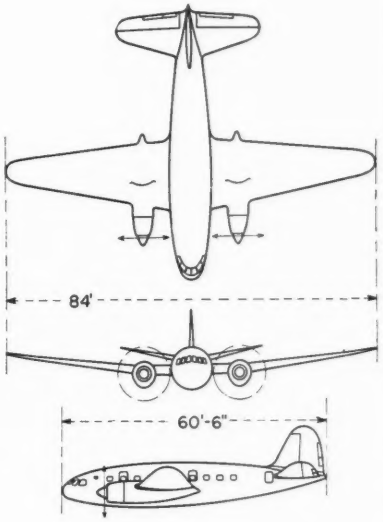
Short Solent

Seating 24-36, this craft is newest descendant of Sunderland, and is also being produced as a patrol bomber under name Seaford. Solent is powered by 4 Bristol Hercules of 1,775 hp. each, and is said to have 236-mph. top speed and 218-mph. cruising speed. Gross weight of this all-metal boat is 75,000 lb., while weight empty is given as 43,280 lb. Normal range is 2,450 mi. Wing area is 1,687 sq. ft. Payload is just under four tons.



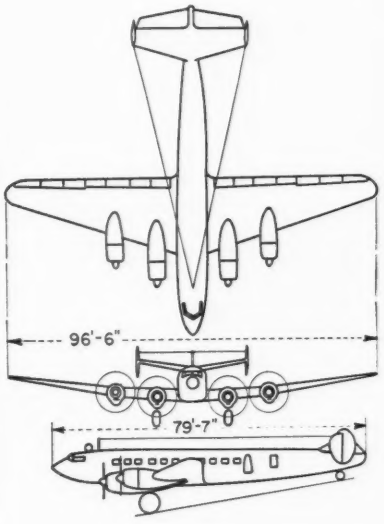
SO-30R Bellatrix

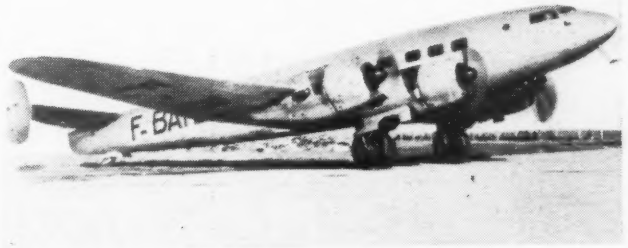
Mid-wing metal airliner is powered by 1,730-hp. Gnome-Rhones and can carry 30 passengers at top speed of 342 mph., and cruising speed of 255 mph. Range is said to be 2,100 mi. Gross is 37,000, empty weight is 15,990. Cabin is pressurized. Retractable tricycle landing gear is used. Wing area is given as 882.3 sq. ft. Four-blade constant speed Ratier props are standard equipment. A climb of 1,200 fpm. is reported by manufacturers.

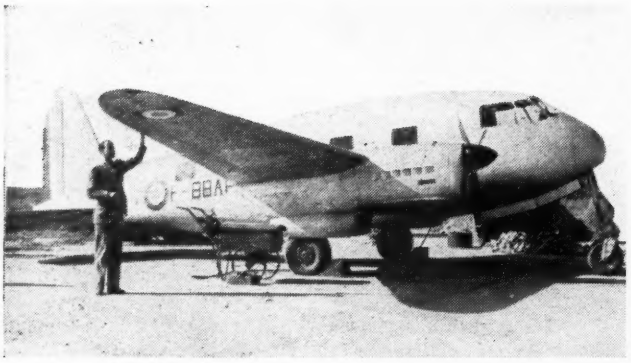


SO-161 Languedoc

A top speed of 270 mph. is claimed for this 33-seater, which is powered by 4 Gnome-Rhone of 1,020 hp. each. At 44,776-lb. gross weight, cruising speed is 230. Range is about 620 mi. Empty weight is 27,425 lb. All-metal conventional construction is used, as is a tail-wheel undercarriage. Wing area is given as 1,198 sq. ft. Flaps are pneumatically operated, while ailerons are actuated electrically. Air France has 25 Languedocs on order.

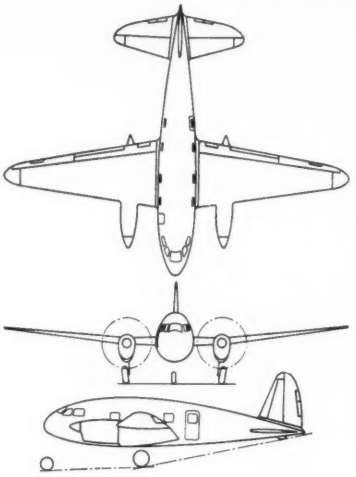


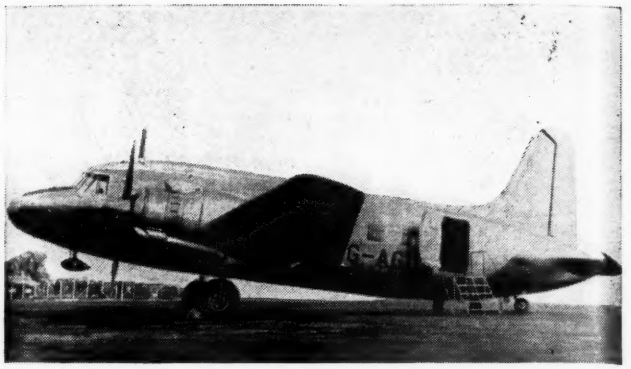




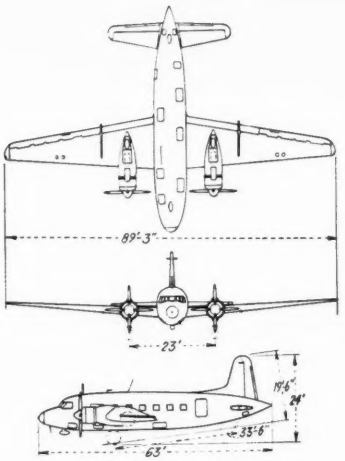
SO-93

Two Renault engines of 400-hp. each are stated to give this new twin-engined French craft a cruising speed of 240 mph. at 4,500 ft., and a normal range of approximately 750 mi. Span is released as 53 ft., and length is given as 39 ft. Transport has been exclusively designed for light postal work, mainly on domestic routes. All-metal construction has been used, including covering. Three-blade variable pitch props, also retractable tricycle landing gear are used.

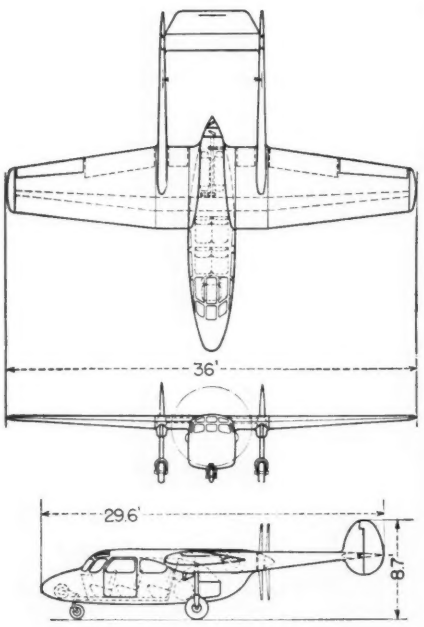




Vickers Viking

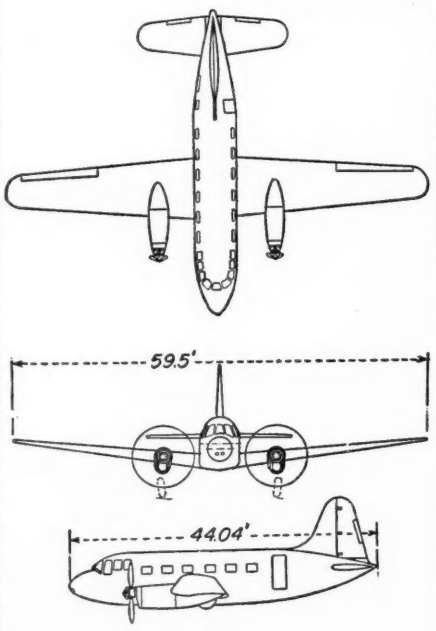


Powered by two 1,695-hp. Bristol Hercules, this 27-place airliner has gone into service with British European Airways. Has top speed of 263 mph., and cruises at 210 mph. Range is 710 mi., and climb 1,400 fpm. Gross weight 34,000 lb., and empty 23,000 lb. Wing area is 882 sq. ft. Construction is metal, and a conventional landing gear is used. Takeoff over a 50-ft. obstacle is 1,150 yd., landing takes 1,300 yd. A crew of four is carried. A propjet version is planned.



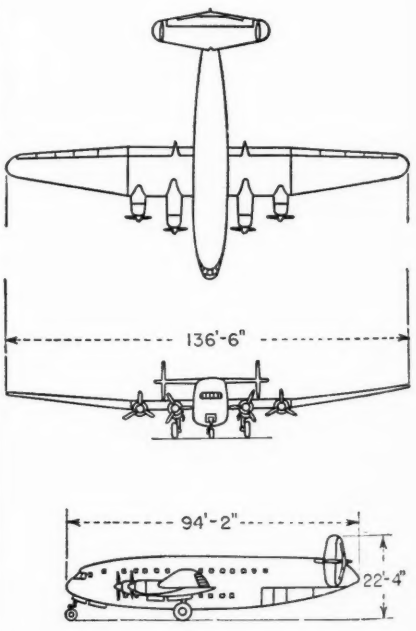
Avia 38-A

Interesting Czech five-placer is twin-boom high-wing pusher powered by two 160-hp. Walter Minors mounted side-by-side and geared to contra-rotating co-axial props. Landing gear is retractable tricycle with main gear swinging backward into booms. Top speed is 193 mph., and cruising 165 mph.



Letov 101

Medium transport built by Czechs seats 12 and is powered by two Argus of 465 hp. each, giving craft 200-mph. top speed. Construction is entirely metal, and gross weight is 11,571 lb. Constant-speed Argus props are installed. Useful load is 4,331 lb., and wing loading is given as 25.96 lb. power loading as 12.3.

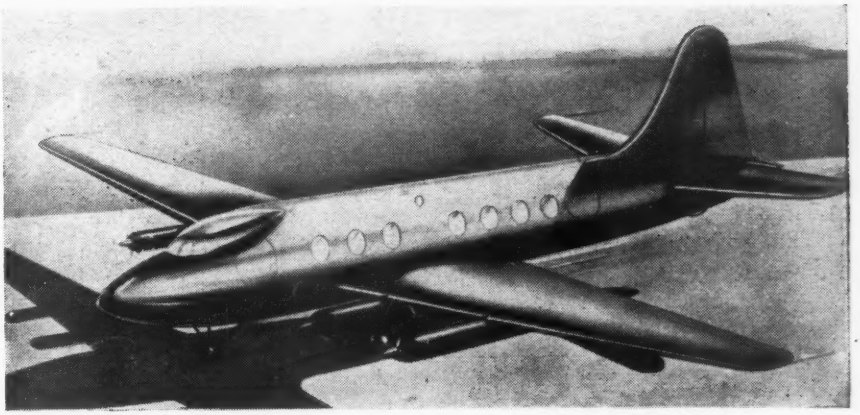


Breguet 761

Very large French transport-freighter is mid-wing craft powered by four 1,600-hp. Gnome-Rhones. Seating up to 101, it has top speed of 323 mph., 621-mi. range, and gross weight 83,800 lb. Empty is 48,500 lb., and wing area 1,922 sq. ft. Loading accomplished through rear bottom of fuselage, fitted with clam-shell doors.

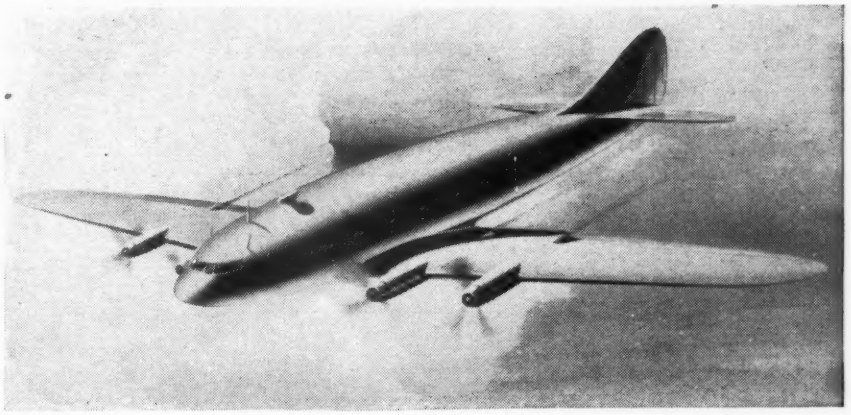
Vickers Viceroy VC-2

A new British airliner project designed to be powered by four Armstrong-Siddeley Mamba propjets of 21-in. diameter giving 1,010 hp. plus 367 lb. jet thrust each. Seating from 24-32 passengers, craft will have an estimated 330-mph. top speed, and 275-mph. cruising speed. Normal range will be 800 mi. Gross weight planned at 38,650 lb., and wing area will total 885 sq. ft. Tricycle landing gear is to be used. Construction will be entirely of metal. This craft is expected to supersede Viking powered by two Rolls-Royce Nenes, both craft bearing some resemblance to each other.



Armstrong Whitworth AW-55

Another projected British transport to be powered by propjets, this craft is to be fitted with four Armstrong Siddeley Mambas of 1,010 shp. each plus 367 lb. thrust. Seating 24-30, craft will have a designed range of over 1,000 mi., top speed of 360, and cruising of 320 mph. Gross weight is to be 36,500 lb. and wing area 840 sq. ft. Construction is to be entirely of metal, and passenger cabin and baggage space will be pressurized and air conditioned. A retractable tricycle undercarriage will be used. Fuselage will be of circular configuration.

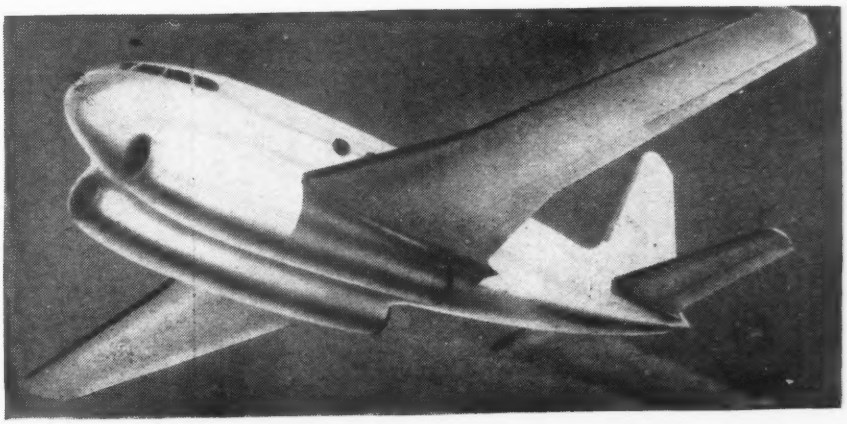


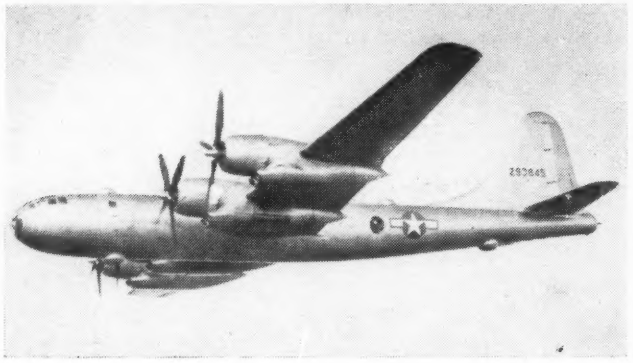
Saunders-Roe SR-45

A huge trans-ocean flying boat to be powered by six large propjets of 5,000 shp. each turning six-blade contra-rotating props. Up to 100 passengers will be seated in twin decks which will be pressurized. Range is planned at 5,000 mi. in still air, and cruising speed as over 300 mph. Grossing about 120 tons, craft is to span 220 ft. and have a length of 146 ft. Fuselage will use figure-8 configuration and hull will have a single step. Retractable wing floats are to be fitted. One of the craft's interesting features will be inclusion of an automatic mooring and docking system.

Fokker F. 26 Phantom

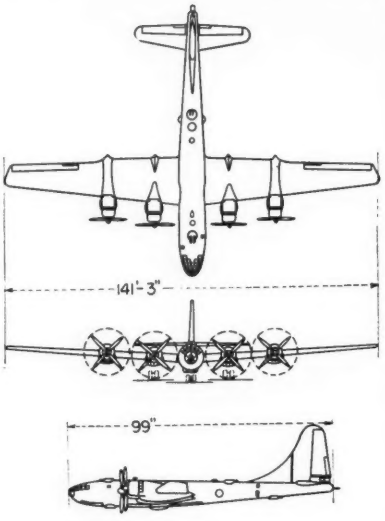
A 17-seater airliner to be powered by two Rolls-Royce Nene turbojets of 5,000 lb. thrust each, mounted close to fuselage. Top speed is estimated at 500 mph., and service ceiling as 40,000 ft. Range is to be 621 mi., and gross weight 25,360 lb., while empty weight is planned at 13,900 lb. Wing area will be 484 sq. ft., and span 59 ft. 9 in. It's expected to attain a cruising speed of over 300 mph. on one engine at 30,000 ft. Payload is estimated at 3,745 lb. Fuel capacity is to be 800 gal. Pressurization will maintain 8,000-ft. conditions within cabin while at ceiling.

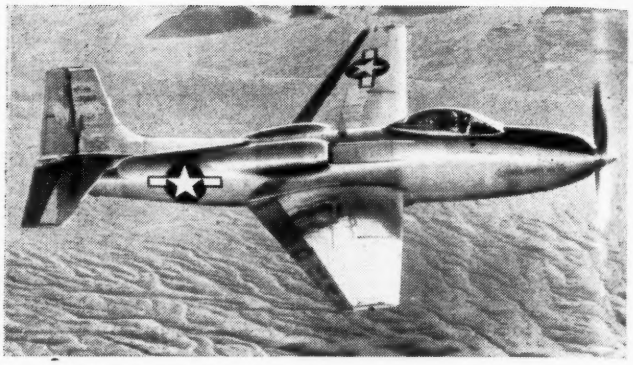


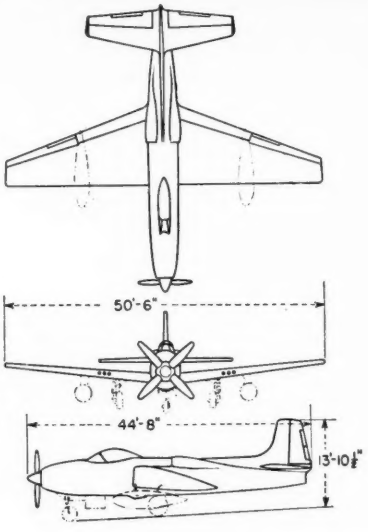


Boeing B-50

Developed from the B-29 Superfortress, principal outward difference lies in its new power plants—P&W 4360 Wasp Majors of 3,500 hp. each which account for larger and different shaped nacelles. This increase in power means greater payload, range and performance, with high speed estimated at better than 350 mph., cruising speed topping 250 mph., and service ceiling of over 35,000 ft. Over 600 interior engineering changes were made in developing this new type.





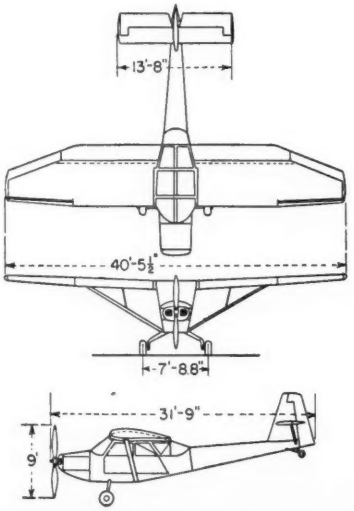


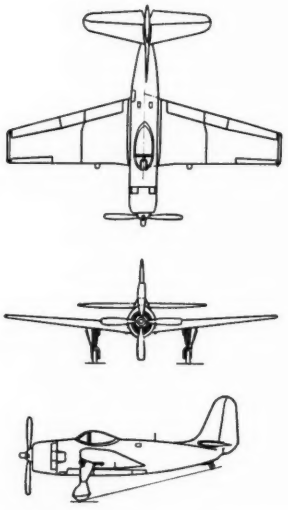
Consolidated Vultee XP-81

First plane to fly with a turboprop, this long range fighter features two gas turbine power plants. In the nose is a General Electric J-31 axial flow unit turning an Aeroproducts propeller and aft of pilot's cockpit is a GE J-33 turbojet unit developing 4,000 lb. static sea level thrust. Long range is achieved by cruising on turboprop unit, with high speeds of over 500 mph. being obtained for combat by starting rear unit. Gross weight is 19,500 lb.

Consolidated Vultee XL-13

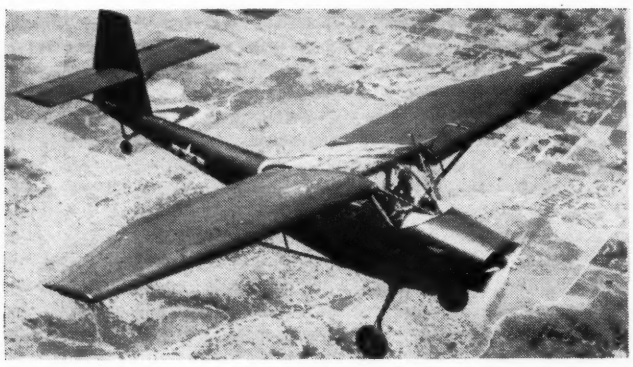
Ordered as result of outstanding work of "grasshopper" planes during World War II, this is new all-metal liaison plane built for AAF. With flaps extended its 245-hp. Franklin engine gets it off ground in run of only 230 ft. It can land in 227 ft. at 43½ mph. Landing gear has adjustable tread—92.58 in. for takeoff and landing and 61.6 for ground hauling and towing — latter possible on roads—with wings folded along fuselage.

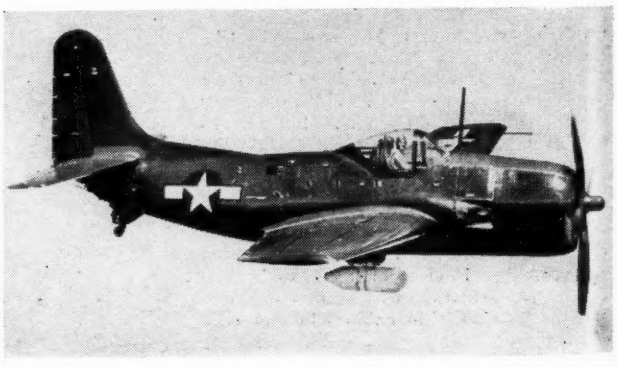




Curtiss XBT2C-1

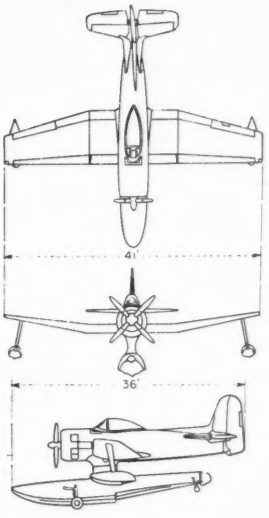
Designed for carrier duty, 10 are being flight tested by Navy for study in torpedo, bombing and rocket work. Normally a single-place craft, radar operator can be carried in jump seat aft and below pilot's cockpit. Fully enclosed bomb bay accommodates full sized aerial torpedo, varied bomb combinations or large rocket. Powered by two-stage supercharged Wright R-3350 of more than 2,500-hp., craft has range of better than 1,400 mi. and gross of over 10,000.

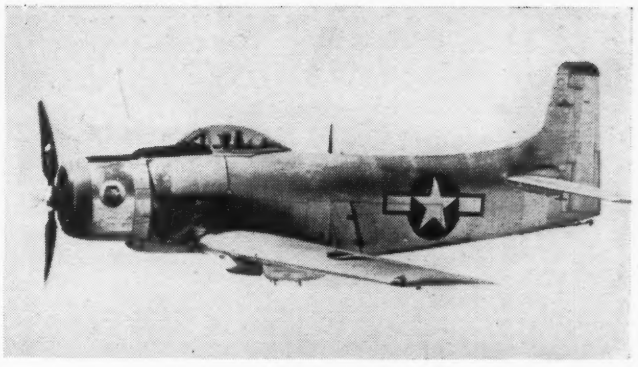


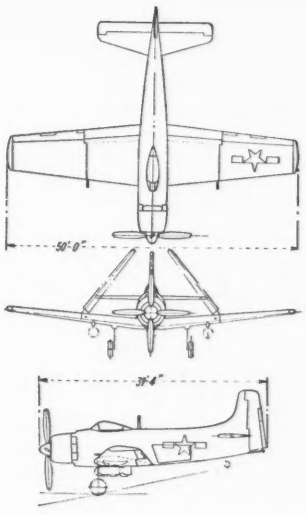


Curtiss SC-2 Seahawk

Developed from SC-1 Seahawk, this improved version can be fitted with fixed landing gear for land-based operations, or Edo floats for battleships and cruiser catapults. Seat aft of pilot's cockpit can be used for air-sea rescue duty. Powered by 1,425-hp. Wright R-1820 engine, Seahawk has high speed of over 250 mph., service ceiling of 28,000 ft. and range of over 650 mi. Gross weight of float version is given as 7,800 lb. Radar is fitted under right wing.





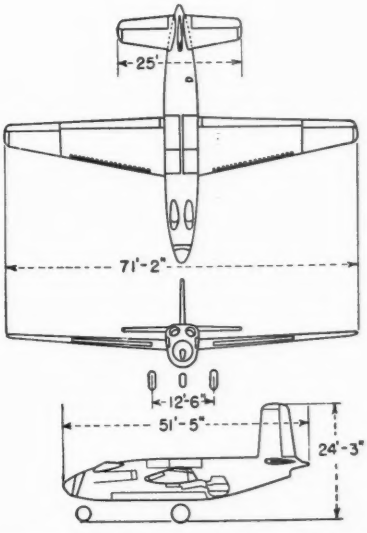


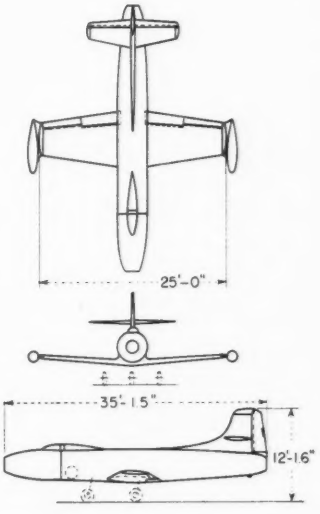
Douglas AD-1 Skyraider

Designed for work from Essex-class carriers it can carry up to 6,000 lb. of bombs, torpedoes, mines, radar gear or extra fuel tanks in addition to its regular armament of 20 mm. cannon and a battery of 5-in. rockets. Special fuselage dive brakes were developed for dive bomb operations. Powered by 2,500-hp. Wright R-3350 engine turning a Curtiss propeller, Skyraider has high speed of over 300 mph. and range in excess of 1,500 mi.

Douglas XB-43

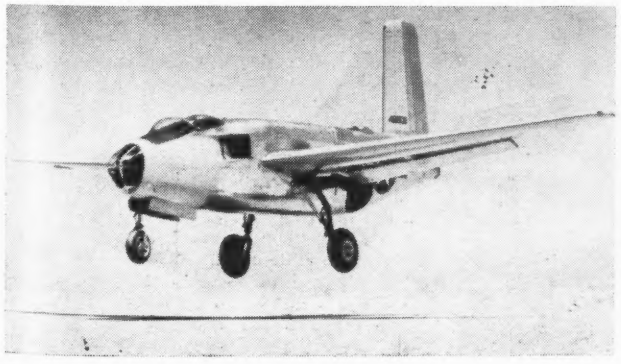
America's first jet propelled bomber, it is basically same airframe as Douglas' XB-42 Mixmaster which featured contra-rotating propellers mounted aft of empennage. Powered by two General Electric J-35 axial flow units of 4,000 lb. static sea level thrust each, XB-43 has high speed of more than 500 mph., service ceiling of over 38,000 ft. and service range of over 1,400 mi. Featuring "bugeye" canopies for pilot and copilot, craft has a pressurized cabin.

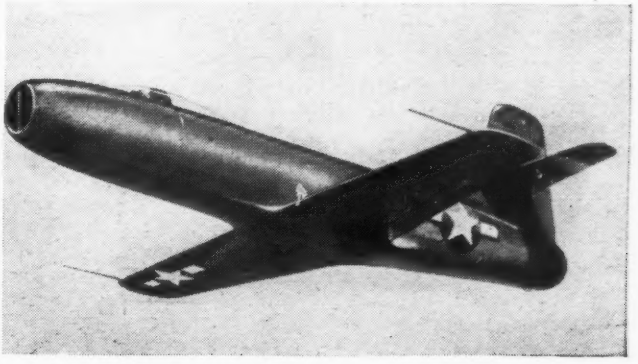




Douglas XS-3

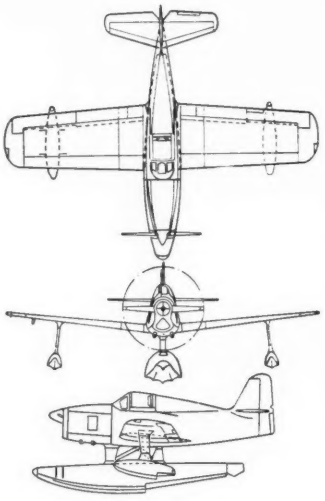
New research aircraft powered by General Electric J-35 turbojet developing 4,000 lb. static sea level thrust. Nose section of fuselage designed to separate from rest of ship in event of difficulty in getting through transonic barrier. Aft fuselage section made of magnesium sheets supported only by vertical formers. Designed for load factors of 18, XS-3 is expected to eventually utilize sweptback wing. Fuel load of 230 gal. is carried in integral wing tanks.

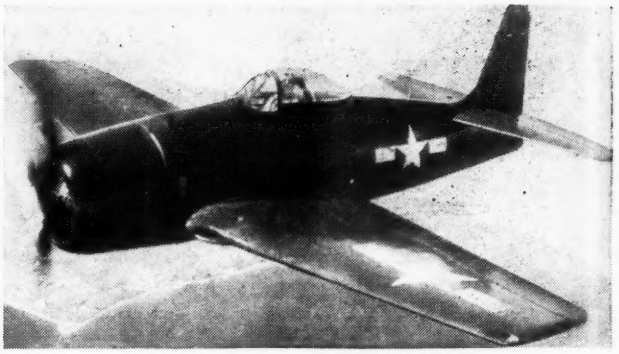


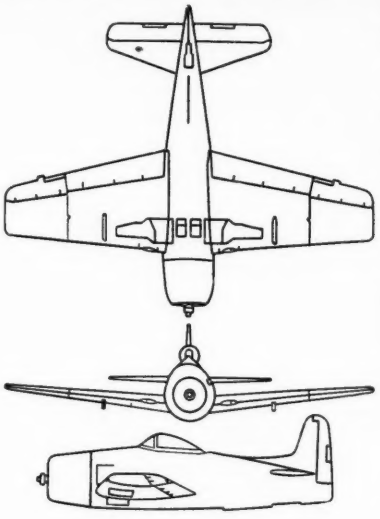


Edo XOSE-1

New single place scout observation craft designed for service with battleships and cruisers. Low gross weight —5,288 lb.—was partially achieved by use of new 75 XA aluminum alloy. "Power package" developed by Ranger makes engine change possible in less than 30 min. Heart of power package is 550-hp. Ranger inverted V-12-cylinder engine giving craft high speed of over 200 mph. and climb of 1,500 fpm. A 2-place "Admiral's Barge," is under development.





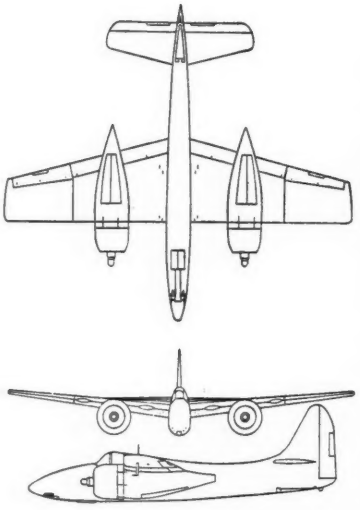


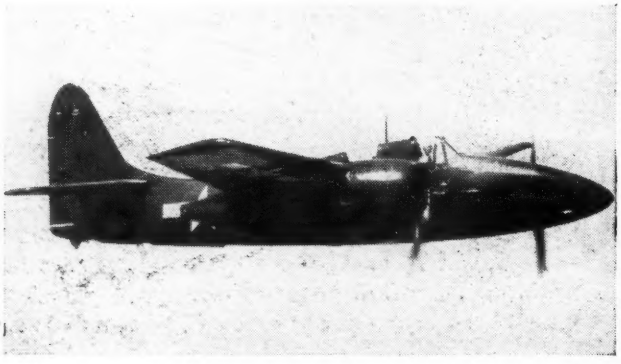
Grumman F8F Bearcat

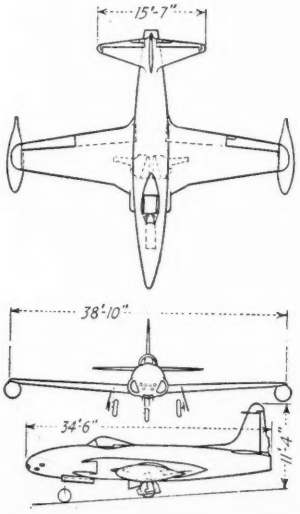
Developed from F6F Hellcat it is, despite same powerful P&W R-2800 engine, lighter in weight. Gross weight is but 9,300 lb. Combination gives F8F greater maneuverability, high speed approaching 500 mph., and initial climb of better than 5,000 fpm. Flush riveting is extensively used and new bubble canopy adds to clean design which contributes to high performance. Droppable fuel tanks give operating range considered essential.

Grumman F7F Tigercat

First twin engine fighter and first tricycle-geared craft produced for Navy carrier duty. Powered by two 2,100-hp. P & W R-2800's it can climb at approximately 5,000 fpm. and has high speed of nearly 500 mph. Heavily armed with 50-cal. machine guns and 20-mm. cannon, it can also carry large complement of rockets. Two - place version, carrying radar gear, is designed especially for long range night fighter work.

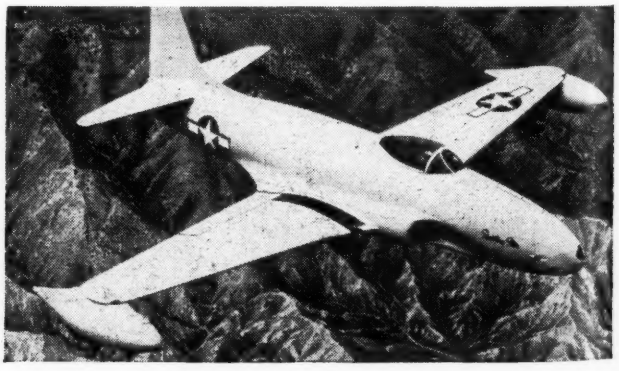






Lockheed P-80A Shooting Star

Most extensively produced American jet fighter, it is holder of many U. S. speed records, including transcontinental dash of 4 hr. 13 min. Powered by General Electric J-33 centrifugal turbojet developing 4,000 lb. static sea level thrust it has high speed of over 600 mph., climb of over 5,000 fpm. and service ceiling of 45,000 ft. Interchangeable nose section houses six 50-cal. machine guns or wide range of photographic equipment.



TAX REVISION...

Can Make or Break American Business

IS THE American way of life—progress by private initiative—going to get a fair chance to demonstrate its superiority over all the challenging varieties of collectivism?

That's the real question before Congress as it confronts the long labor of remodeling the federal tax structure. What Congress does about taxes will come pretty close to making or breaking the U.S.A.

Today the tax colossus that sprawls across the national economy is unguided by any central nervous system. Its crushing weight comes down first here, then there, as the giant wobbles around, unguided by any central purpose except to grab as much as it can.

The central purpose of a tax system is simple. It should raise the necessary revenue without placing unnecessary fetters on enterprise.

As recently as 1929 federal taxes took only one dollar out of every twenty of national income. A loose-jointed and inconsistent tax structure was a nuisance then. But it wasn't serious.

Today the federal tax burden is the dominant element in the nation's economy.

Even if Congress succeeds in cutting $6 billions out of President Truman's $37.5 billion budget, federal taxes still will take about one dollar out of every five of the national income. And few Congressmen are hopeful enough to think that they can get the tax load below $25 billion for any year that is in sight.

Drastic Budget Cuts Required

Indeed, to get the tax load down to $25 billion, Congress will have to stop treating expenditures, like those for military purposes and veterans, as politically sacrosanct. Congress must scrutinize *every* item in the budget. Economy must go along with tax cutting or we shall end in bankruptcy.

Suppose that expenditures are slashed to the bone. Our taxes *still* will be so heavy that the *way* they are loaded on the nation's back will make a big difference in how well the nation gets along. That's something which the postwar boom has tended to obscure. It will become much clearer as this boom wears off. Then a remodeling of the federal tax system to remove its manifold obstructions to private enterprise will be of transcendent and obvious importance to everybody.

Tax Experts Agree

The remodeling will require political courage plus tax wisdom. Congress must supply its own political courage. But it can lean on tax experts for tax wisdom. Fortunately, tax experts now agree on the necessary reforms—especially on those that will remove obstructions to business. How well the tax experts agree is shown in the charts on the next page, summarizing answers to a questionnaire on possible federal tax reforms. The questions were asked by the Department of Economics of the McGraw-Hill Publishing Company. The answers came from a broad cross-section of tax experts, including the authors of a considerable crop of books on postwar federal taxes and what to do about them.

The experts agree (see the charts) that double taxation of corporate dividends should stop.

They agree that the tax rate on corporate income (now 38 percent) should be reduced as rapidly as possible to the initial rate on individual income (now 20 percent).

And they agree overwhelmingly that it is desirable to let net losses be subtracted from net profits over a 5-to-6-year period in computing business income for tax purposes.

All three changes would stimulate corporate initiative and hence make jobs. Averaging business incomes would make new ventures attractive even though these ventures *might* result in early losses. Reduction of the corporate income tax would have the same effect. So, too, would the elimination of that highly discriminatory provision whereby corporate dividends are taxed first as corporate profits, and again when received as income by individuals.

Penalties on Incentives

Beyond these changes, there must be an end to tax penalties on *individual* initiative. Consider the enterprising business man whose income fluctuates markedly from year to year. Because of his enterprise he may pay, on the same income, twice as much federal income tax as the man who plays it safe for a steady income. That's because he can't average his personal income over several years for tax purposes. He can count on heavy taxation of his good-year profits with no chance for offsetting against them his bad-year losses. It is a case of heads you lose, tails the tax collector wins. Eighty-six percent of the experts agree that an income-averaging allowance for individuals is desirable.

Three-quarters of them also agree that tax rates at the top end of the individual income scale (now running up almost to 90 percent) should come down. In my judgment, the total tax should not amount to more than 50 percent to encourage business men to venture for high stakes.

Advocating tax relief for men in the higher income brackets—and particularly for management men—has been considered political suicide for more than a decade. Some members of Congress still hold that view. A Democratic Congressman from Michigan told an Illinois colleague who advocated cutting upper bracket taxes, "If you put that idea forward at home, you won't come back."

The Congressman has an even better chance of not going back if our economy bogs down. One of the best ways to bog it down is to keep the taxes that destroy business incentives and block enterprise—for example, the confiscatory rates which drive the people in the high brackets away from risk-taking.

To give the American system of individual enterprise a fair chance was clearly the mandate of November's election. To give it that chance, enterprising business men must have a chance to make large rewards—as well as the always-present chance to lose their shirts. Under present tax rates, they don't get a break.

Prevailing federal taxation throttles bold business enterprise in other ways. It fails, for example, to encourage research and rapid industrial modernization. It tends to siphon investment away from private enterprise, driving it into tax exempt state and local securities. (The experts agree almost to a man that such tax exemption must be eliminated.) The list of obstacles could be amplified.

Hit-and-Run Revision Disastrous

Most of the reforms needed to prevent the federal tax system from smothering enterprise would lower federal revenues, at least temporarily. Elimination of the double taxation of corporate dividends might lop off $800 million. Dropping the corporate income tax from 38 percent to 20 percent might cut away as much as $4 billion.

Because we can not avoid enormous federal expenses in the years immediately ahead, all badly needed reforms of the type to which this article is confined obviously can't be made at once. Also there are other tax reforms bearing on consumption which obviously should be weighted in an over-all program of tax revision.

But this is equally obvious: We should have a general design for tax revision which would line up all the necessary steps. Then we could get ahead with tax reductions as rapidly—and as sensibly—as revenue requirements and political courage would permit. Tax cutting may come piece-meal, but tax planning must not.

Through such a design we might discover that some decidedly beneficial improvements in the federal tax structure can be made at relatively slight cost. But today there's no way to be sure. No one in Washington with access to the information has even undertaken to make the necessary estimate.

Instead, federal tax revision continues to be a hit-and-run business—and a short-run political business. Take, for example, the proposal of a 20 percent tax reduction across the boards. There are virtues in such a proposal. But how they stack up beside many other extremely urgent needs for tax reform remains a mystery.

Congress must dispel such mysteries. Only in that way will it do the job of converting our present jerry-built tax structure into a moderately safe abode for the American system of private initiative, sparked by adequate incentives.

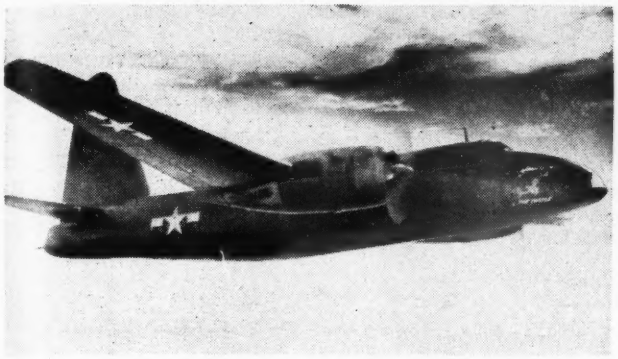
EXPERT OPINION ABOUT TAX REVISION

TAX EXPERTS THINK WE SHOULD:	% Of Tax Experts Favoring the Proposed Changes
1 ***Eliminate double taxation of corporation dividends*** which are now taxed as corporate profit and then again as individual income.	92%
2 ***Reduce corporation income tax rate (now 38%)*** as rapidly as budget needs permit until it equals the initial rate for individual incomes (now 20%).	73%
3 ***Provide for averaging business' taxable incomes*** over a period of about 6 years to allow for losses in bad years.	97%
4 ***Provide for averaging individuals' taxable incomes*** over a period of a few years so as to treat fairly those whose incomes fluctuate.	86%
5 ***Reduce upper bracket individual income tax rates*** to a maximum of 50% in the $100,000 bracket and 75% in the million and over bracket.	76%
6 ***Treat capital gains, now taxed at a lower rate,*** like other income but provide full allowances for losses.	64%
7 ***Remove the privilege of tax exemption*** from all future issues of state and local government bonds.	92%

James H. McGraw, Jr.

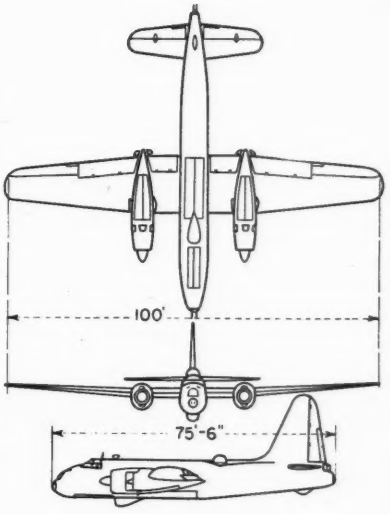
President McGraw-Hill Publishing Company, Inc.

THIS IS THE 56TH OF A SERIES



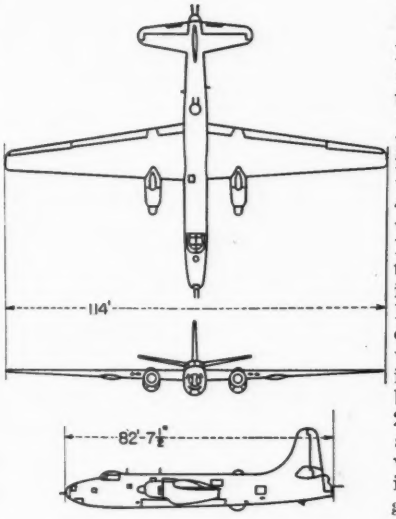
Lockheed P2V-1 Neptune

Navy craft of this type named Truculent Turtle recently set world distance record on 11,665-mi. flight from Perth, Australia to Columbus, Ohio. Though design gross wt. is 58,000 lb. Truculent Turtle took off with JATO at 85,500 lb., for wing loading of 85.5 lb. per sq. ft. Powered by two 2,500-hp. R-3350 Wrights. Neptune's high speed is over 300 mph., while landing speed is listed at 78 mph. Span is 100 ft., length is 75 ft. 6 in.



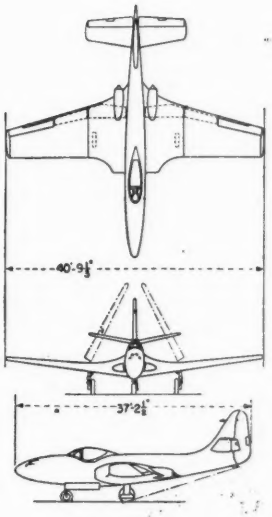
Martin XP4M-1

New long range patrol, bombing, and torpedo-carrying craft featuring composite power plants housed in two nacelles. Each nacelle has P & W R-4360 Wasp Major developing 3,000 takeoff hp., and General Electric J-33-4 developing 4,000 lb. static sea level thrust. With crew of ten and gross weight of 80,681 lb.—including 8,000 - lb. bomb load—range is 2,940 mi. High speed at 80,681-lb. gross weight is 398 mph. using reciprocating engines and jets.



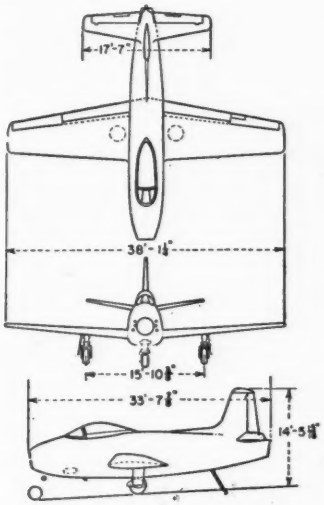
McDonnell FD-1 Phantom

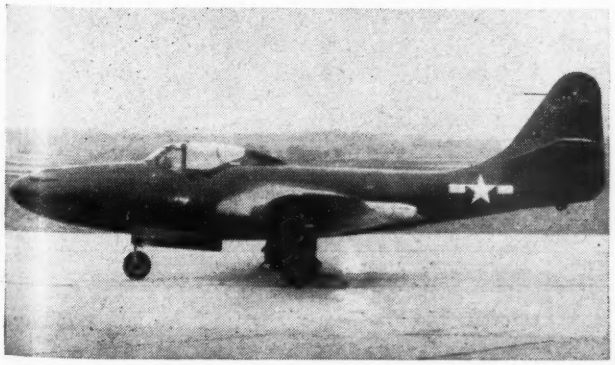
First all-jet plane to go in service with Navy for carrier duty, FD-1 has high speed of over 500 - mph. Powered by two 6-stage axial flow Westinghouse 19-B turbojets delivering 1,400 lb.-plus static sea level thrust, craft has service ceiling higher than 37,000 ft. and range of over 1,000 mi. Despite twin power plants, gross weight is under 10,000 lb. Armament consists of four 50-cal. machine guns in nose. (Also see Aviation for Nov., 1946).



North American XFJ-1

Reported to be Navy's fastest plane it is officially credited with high speed "well over 500 mph." Now in production, it marks North American's first entry in jet propelled field, followed closely by its new XB - 45 four - jet bomber for the AAF. Powered by one General Electric J-35 axial flow turbojet, XFJ-1 has single straight ram duct with entrance in craft's nose. Its thin, high speed laminar flow wings have droppable tip tanks.





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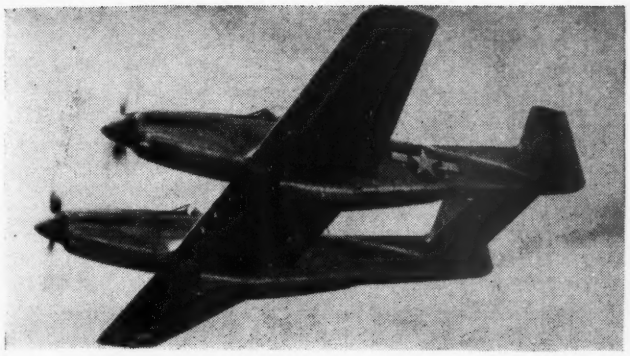
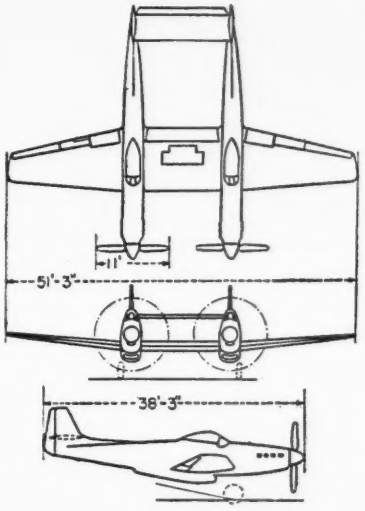
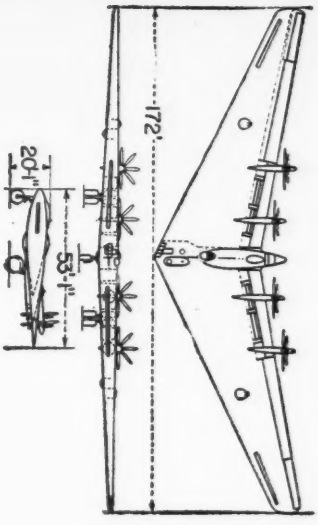


North American P-82 Twin Mustang

Developed for ultra-long range escort missions, each fuselage accomodates a pilot as means of reducing pilot fatigue. In addition, an automatic pilot is fitted in left fuselage. Powered by two Packard Merlins turning four-blade full feathering Aeroproducts propellers, total power output exceeds 4,000 at sea level. Fuel capacity of 600 gal. give range of 3,000 mi. High speed is over 480 mph. at 25,000 ft., climb is over 5,000 fpm. in initial phases.



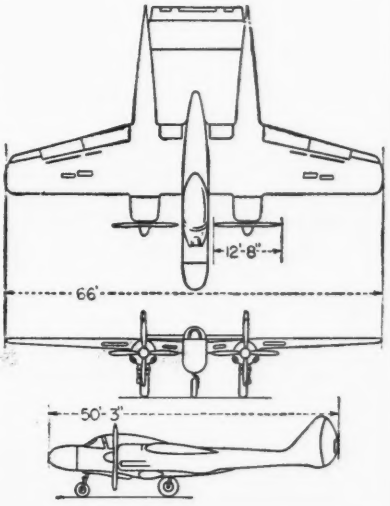


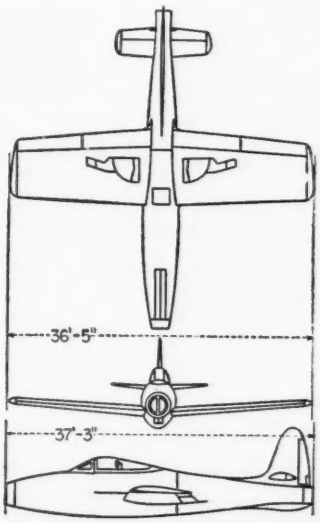
Northrop XB-35

World's largest flying wing aircraft, gross overload weight of this super-bomber is 209,000 lb. and empty weight is 89,000. Powered by four 3,500-hp. P & W R-4360 Wasp Majors turning 184-in. contra-rotating pusher Hamilton Standard propellors, XB-35 has high speed of over 400 mph. and range in excess of 10,000 mi. Jet propelled version — YB-49 — to be powered by General Electric J-35 axial flow units of 4,000 lb. thrust is under way.

Northrop F-15 Reporter

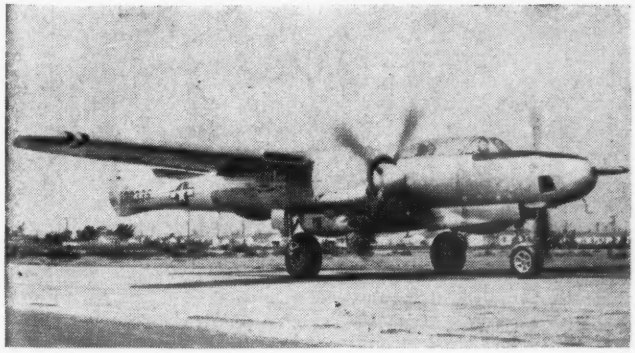
Developed from widely used P-61 Black Widow night fighter, the Reporter is a two place long range photo reconnaissance craft. Powered by two 2,200-hp. P & W R-2800's turning 152-in. Curtiss electric propellers, it has a high speed of over 440 mph., service ceiling of over 35,000 ft. and, with 500-gal. fuel capacity, range of more than 4,000 mi. Gross weight with full photographic equipment is over 28,000 lb.

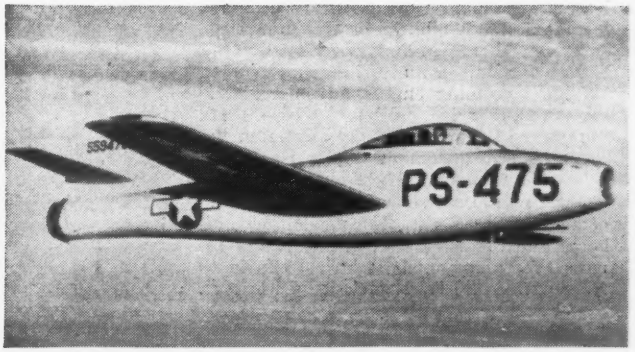


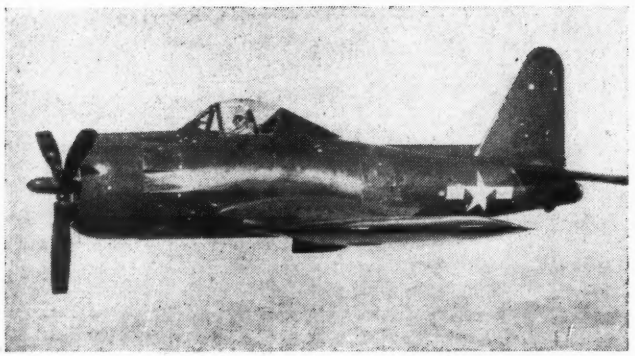


Republic P-84 Thunderjet

In the "600-mph. class" it is credited with having done 616 mph. in trials at AAF's Muroc Lake base. Powered by a General Electroc J-35 axial-flow turbojet, it has a service ceiling of better than 40,000 ft. Air intake in nose gives straight-line flow of air into compressor aft of and below cockpit and out through variable jet exhaust under empennage. Craft is in large scale production at Republic's Farmingdale, L. I. plant.

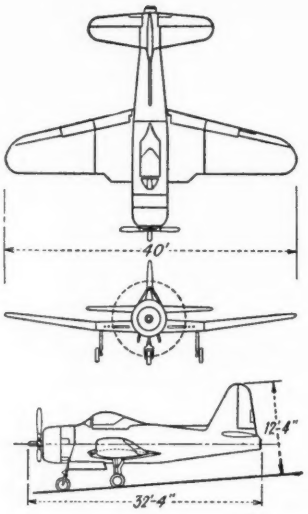


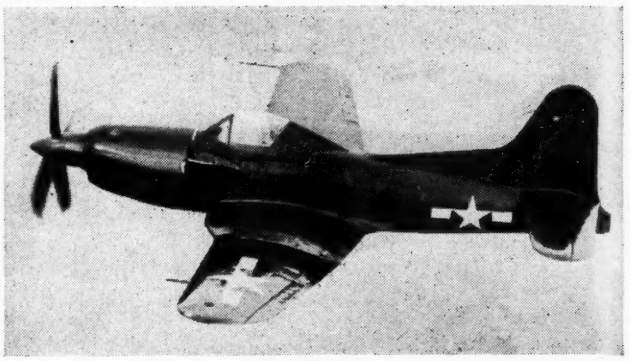


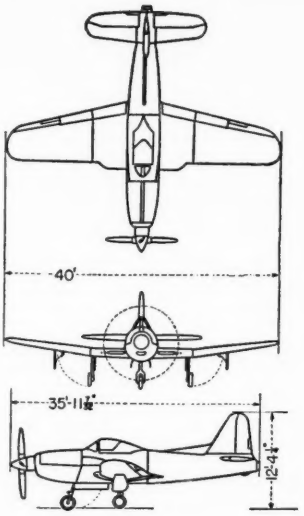


Ryan FR-1 Fireball

Navy's first jet fighter, and first composite-engine craft in service with fleet air arm. Power plant consists of 1,350-hp. Wright R-1820 reciprocating engine in nose and General Electric J-31 turbojet mounted in fuselage aft of pilot. Latter engine is modified to use same fuel as piston engine, eliminating need for dual fuel system. High speed on either engine alone is over 300 mph., with both it exceeds 425. Climb is over 5,000 fpm. range exceeds 1,500 mi. Gross weight is 9862 lb.





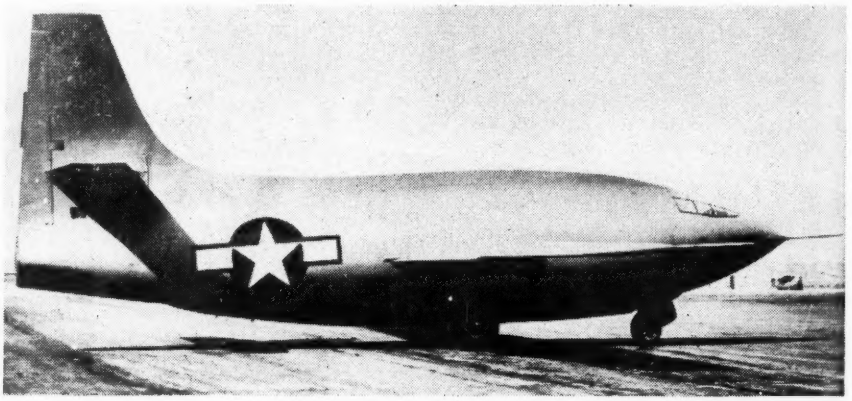


Ryan XF2R-1

Airframe is basically same as FR-1 with additional vertical stabilizer area to compensate for greater torque. Main difference in craft is in power plant, for nose engine is General Electric T-31 turboprop turning four-blade Hamilton Standard propeller. Turbojet in fuselage is GE J-31, as in predecessor type. Now undergoing tests at factory after two mo. at Muroc Lake test base, performance data are still restricted. However, both high speed and rate of climb exceed those of FR-1.

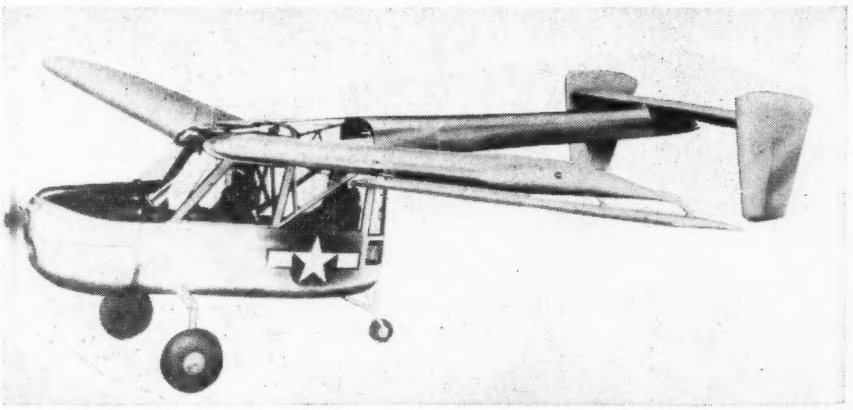
Bell XS-1

America's first project designed to probe transonic and supersonic ranges, XS-1 is a cooperative research venture of Bell Aircraft, Army Air Forces and NACA. Power plant is a 4-cylinder Reaction Motors Inc. Model 6000C4 rocket engine, first in this country designed specifically for supersonic flight. Developing up to 6,000 lb. thrust, the engine is capable of giving XS-1 a top speed of 1,700 mph. at between 60,000 and 80,000 ft. Completely instrumented to record all essential data the craft has already made its initial power flights. (Also see Aviation for Sept. 1946 and Jan. 1947.)



Boeing XL-15A

Unusual gondola type cabin is designed for maximum visibility of this new type craft now being built for Army Ground Forces for liaison and utility work. With 125-hp. Lycoming engine, initial climb is 628 fpm., service ceiling is 16,400 ft., high speed is 112 mph., and minimum flying speed, less than 50 mph. Craft can take off and clear a 50-ft. obstacle in 600 ft., and will land over a 50-ft. obstacle and come to full stop in 247 ft. Wings, tail boom and tail surfaces can be quickly removed for shipment by truck. Span is 40 ft., length is 26 ft. 1.2 in., height is 8 ft. 8½ in.



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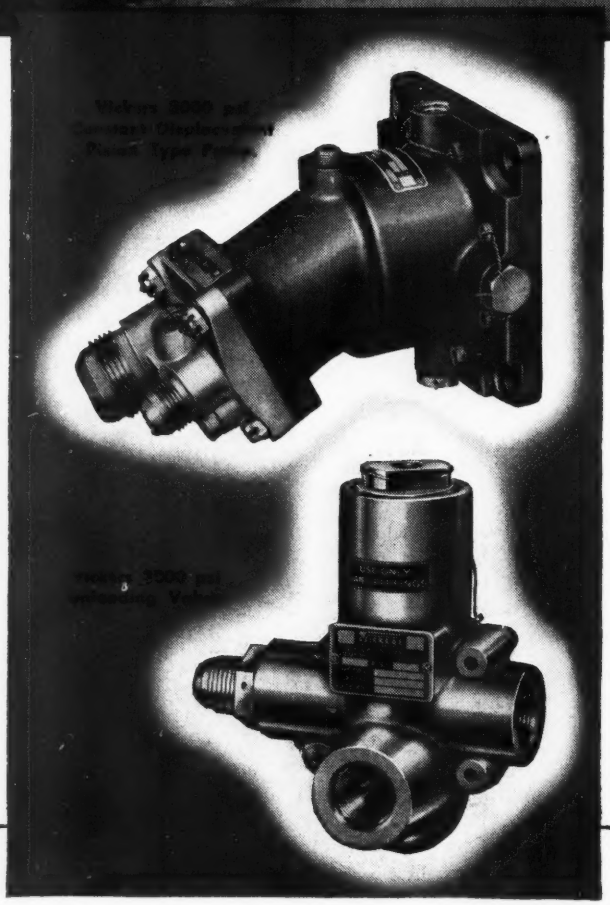

Capital Airlines use the Vickers Units shown at the left in the 3000 psi hydraulic system on its DC-4's.

The Vickers Piston Type Pump has a maximum recommended operating pressure of 3000 psi and maximum recommended speed of 3750 rpm at which the horsepower output is 13.3 hp. As the pump weighs only 6.8 lb, it has the exceptionally low weight ratio of 0.51 lb per hp. The volumetric efficiency of 94% and the over-all efficiency of 88% are exceptionally high. These efficiencies are maintained throughout the service requirements.

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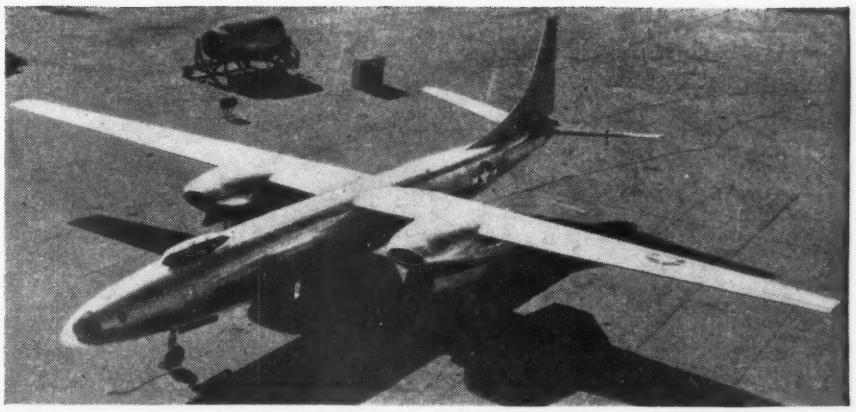
ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

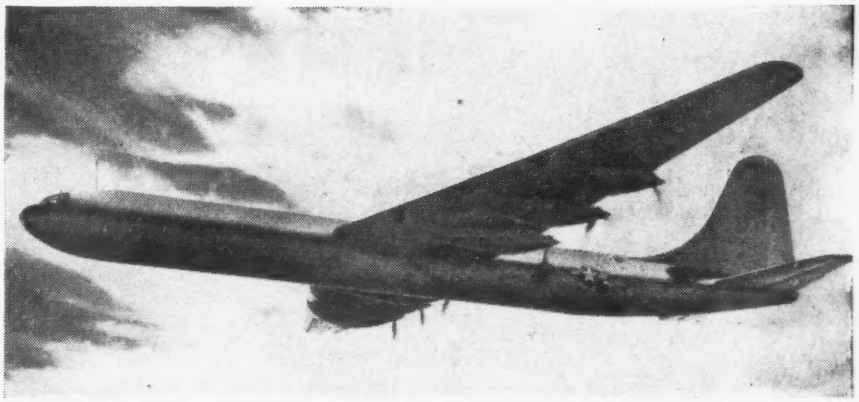
Consolidated Vultee XB-46

First photo of new jet bomber now being readied for extensive flight test program. Powered by four General Electric J-35 turbojets developing 4,000 lb. static sea level thrust. Two units are housed in single nacelle on each side, giving craft appearance of being twin engine type. Classed as medium bomber, its 113-ft. wingspan makes it nearly as large as Boeing B-29 which has span of 141 ft. 3 in. XB-46 length is 105 ft. 9 in. Noteworthy are sharply pointed transparent section at bombardier's station in nose and fighter-type bubble canopy giving pilot excellent visibility.



Consolidated Vultee XB-36

World's largest bomber, now in production at Convair's Ft. Worth, Texas plant. Capable of carrying an atomic bomb to any inhabited region of the world and returning home without refueling, it can carry 10,000 lb. of bombs 10,000 mi. or maximum capacity of 72,000 lb. a shorter distance. Gross weight is 130,000 lb. Though performance figures are restricted, high speed is known to be over 300 mph. It is powered by six P&W R-4360 Wasp Major engines developing 3,500 hp. each at sea level, and turning 228-in. diameter Curtiss electric propellers. Pusher installation suggests possibility of using turbojets.

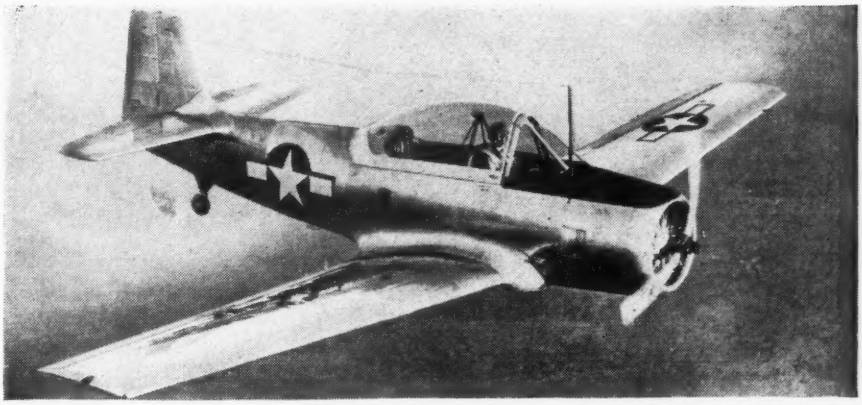


Curtiss XF15C-1

One of three of this composite-engine type delivered to Navy's Test Center at Patuxent River, Md. Principal difference is in propeller installation; one having Curtiss Electric, one a Hamilton Standard, the other an Aeroproducts. Reciprocating power plant is P&W R-2800 of 2,100 hp.; turbojet located in lower part of aft fuselage is Allis-Chalmers-built Halford H-1B unit. Additional thrust is obtained from reciprocating engine through use of jet exhaust stacks. No performance or construction data have been released by Navy, nor has information on possible orders.

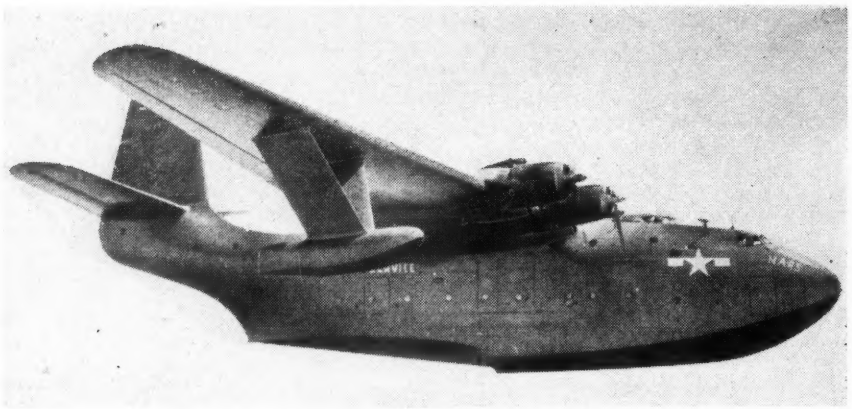
Fairchild XNQ-1

Newest Navy primary trainer is designed to give student pilots familiarity with fighter craft they will later fly. Powered by 9-cyl. 320-hp. Lycoming engine turning a Hamilton Standard propeller, XNQ has high speed of over 170 mph. and climb in excess of 1,000 fpm. Feature is standardized cockpit developed by AAF, Navy and RAF—designed for easy identification—in which all controls are located in similar position. Thus student learns at beginning of training where units are located and can know they will be in same relative location regardless of make of plane he may later be flying.



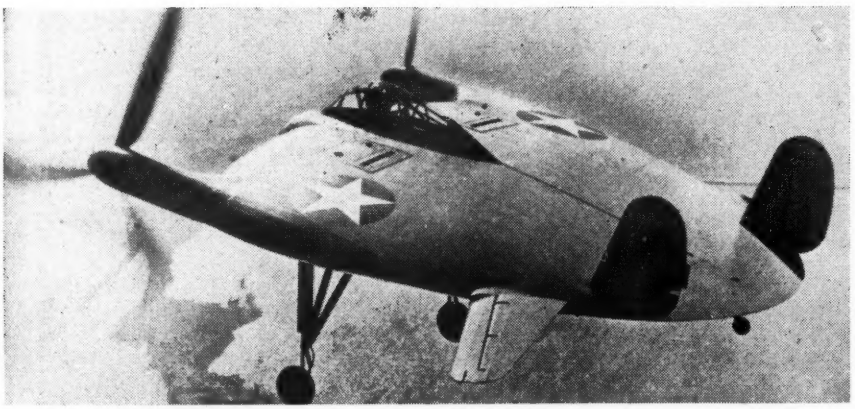
Martin AM-1 Mauler

Dive- and torpedo-bomber now in production for the Navy. As with other current tactical types, large complement of rockets can be carried beneath wings, adding greatly to firepower. Powered by 3,000-hp. Pratt & Whitney R-4360 Wasp Major turning Curtiss electric propeller, Mauler has maximum speed of over 350 mph., and operating range of more than 1,150 mi. Span is 50 ft. 1 in., 6 in., length is 41 ft. 6 in., height is 16 ft. 11 in. Wing area totals 496 sq. ft. Gross wt. is 21,000 lb., wt. empty is 14,100 lb.



Martin JRM-2 Mars

Developed from well-known Naval Air Transport Service type, it differs from predecessor craft in that it is powered by four P&W R-4360 Wasp Majors giving 3,000 hp. each. (JRM-1 has 2,200-hp. Wrights.) With range of 6,750 mi., it has top speed of over 250 mph. and service ceiling of 15,000 ft. Span is 200 ft., length is 120 ft. 3 in., and height is 44 ft. 7 in. Wing area totals 3,686 sq. ft. Gross weight of this new type is 165,000 lb., empty weight is 81,261 lb. Capt. C. H. Schildhauer, now of NATS, has filed application with CAB for globe-circling cargo routes, contemplating use of flying boats of the Mars type.

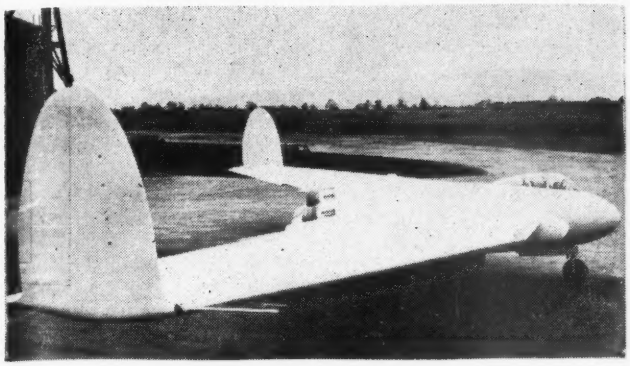


Vought XF5U-1

A revolutionary new combat concept, resulting in amazing speed range, is featured in design of this odd-appearing circular-wing craft. Seen here is flying scale model used to gather technical data on performance. It's said that with standard power plants speed ranges from 40-420 mph.; with water injection added, 20-460; and with gas turbine 0-550 mph. Actual Navy craft is powered by two P&W R-2000 Twin Wasps of 1,350 hp. each. Most noteworthy characteristic is craft's ability to almost hover on specially built props. Much pioneering research has been done by Charles Zimmerman.

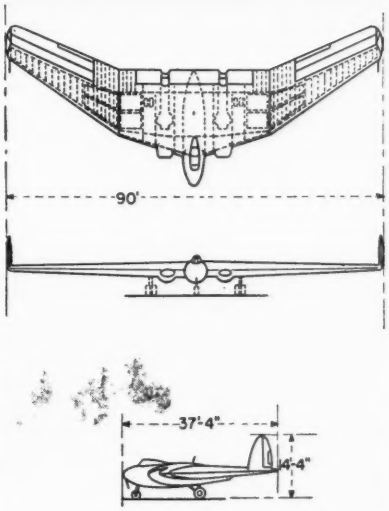
Vought XF6U-1 Pirate

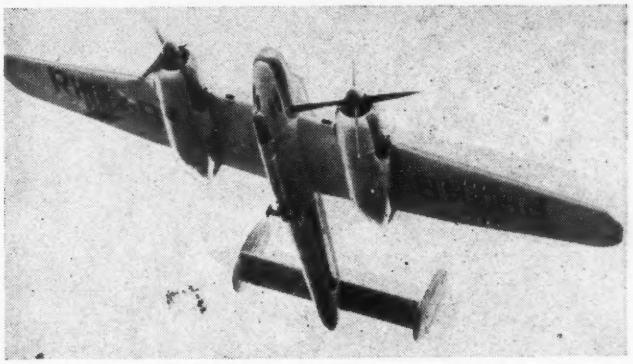
New carrier-fighter developed for Navy, the first jet-propelled craft to be built by Chance Vought Aircraft. Powered by Westinghouse 24C axial flow turbojet it is the "well over 500-mph. class." Air intakes are filleted in wing leading edges, and turbojet engine is located in lower part of fuselage. Span is 30 ft. 2 in., length is 32 ft. 10 in., and height is 11 ft. 9 in. Feature of craft is extensive use of Metalite, new structural material consisting of two thin sheets of high strength aluminum alloy bonded to balsa wood core, giving smooth finish and light weight.

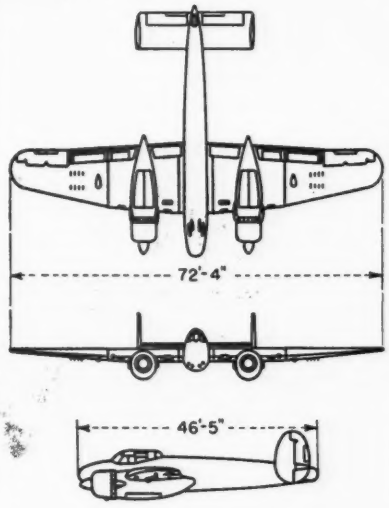


Armstrong Whitworth 52

Britain's first j-p all-wing tailless craft is research type for gathering data on future giant airliners yet on drawing boards. Powered by two Rolls-Royce Nenes set close to cockpit nacelle, all-metal craft weighs 30,000 lb. loaded, and has 90-ft. span. Wing area 1,314 sq. ft., and wing loading given as 25.1 lb. Most noteworthy feature is unique boundary layer control, whereby necessary suction is created by auto-flaps located in engine intakes.





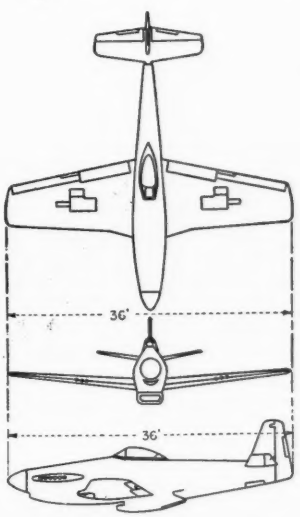


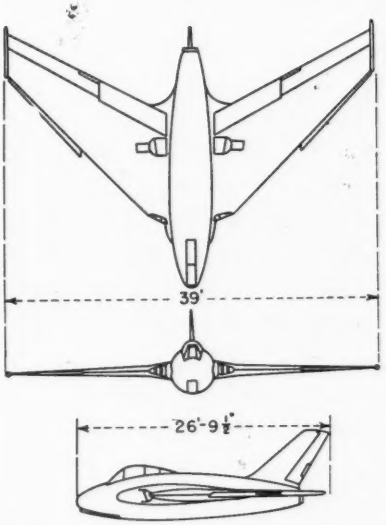
Bristol Brigand

A new 3-place attack-torpedo-bomber designed to carry wide range of offensive armament. Powered by two 2,810-hp. Bristol Centaurus radials, top speed of 323 mph. is claimed at full load. Cruising 292, and climb 1,500 fpm. Range is given as 1,980 mi. on 1,060 gal. Gross weight 38,200 lb., and empty 27,500 lb. Wing area 718 sq. ft. Conventional tail-wheel landing gear and all-metal construction is used. Normal crew is 3. Service ceiling is put at 26,000 ft.

Commonwealth C.A. 15

Latest Australian-designed and-built fighter bears striking resemblance to NAA Mustang, but has Rolls-Royce Griffon engine of 1,900 hp., giving reputed top speed of nearly 500. Gross weight given as 9,500 lb. Service ceiling over 36,000 ft. Normal armament consists of six .50 guns and ten rockets. Up to 460 gal. of fuel can be carried, including auxiliary tankage. Prop is a British-designed Rotol with pressed wood blades.





DH Swallow

Designed to explore control problems in relation to sharply sweptback wings, and also to gather data for a forthcoming trans-Atlantic jet airliner, Swallow is powered by 3,000-lb. thrust DH Goblin turbojet. One of these aircraft is believed to have reached a speed of well over 600 mph. before it disintegrated. Construction entirely of metal and retractable tricycle gear is fitted. Newer models have with auto-leading edge slots in place of fixed type.

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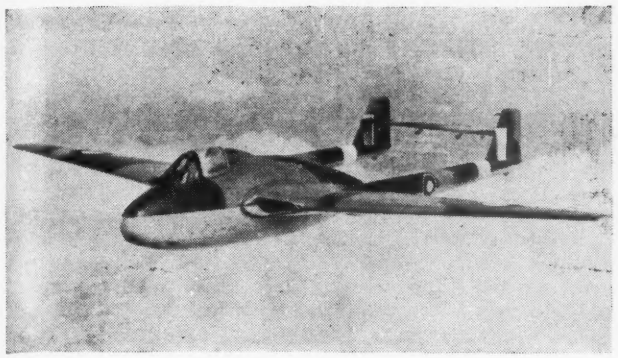
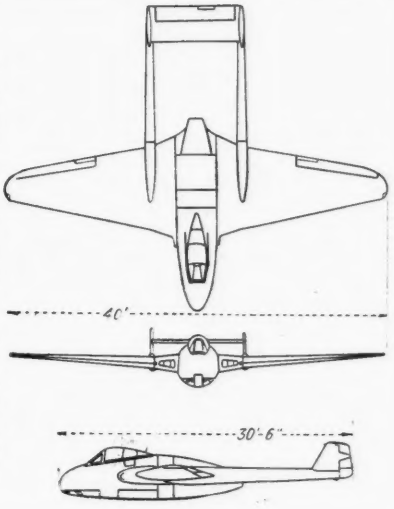
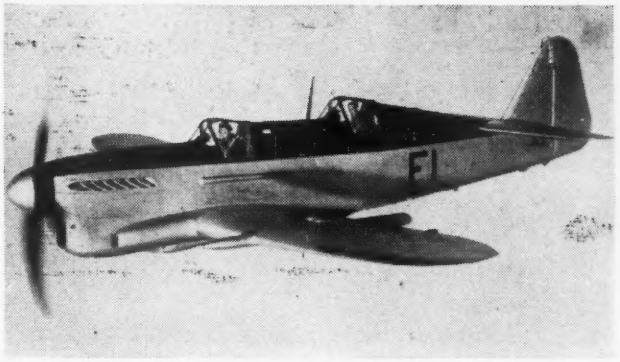
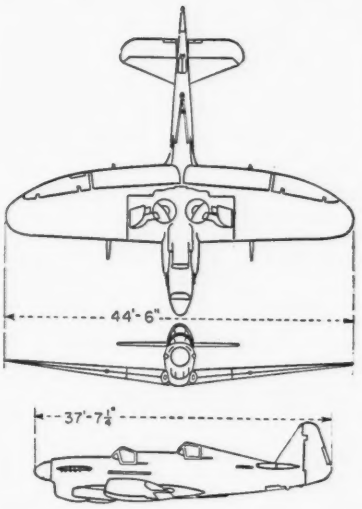


DH Vampire

Now in service with RAF, these twin-boom j-p fighters have already been exported to several foreign air forces. Powered by a 3,000-lb. thrust DH Goblin, top speed 540, while climb is 4,250 fpm. Service ceiling listed as being 51,000 ft., and normal range as 1,050 mi. Construction is wood and metal, and landing gear is tricycle. Take-off over 50 ft. obstacle is said to be possible in 850 yd. Wing area totals 264.7 sq. ft. Also serves in Navy.





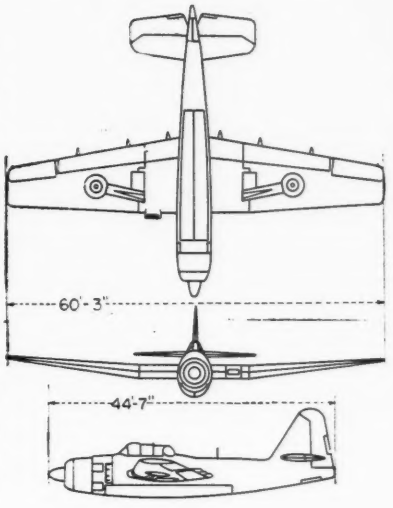


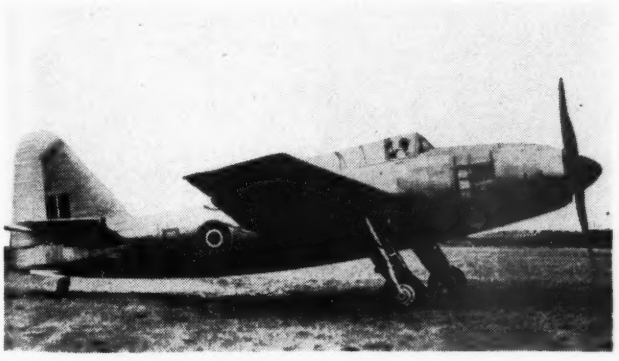
Fairey Firefly Trainer

A two-place adaptation of Royal Navy's standard attack-recon. plane, this new version is used for advanced training for specialized crews. Powered by one 1,815-hp. Rolls-Royce Griffon, top speed 305, cruising 196, and stalling 80 mph. Normal range is 805 mi., while service ceiling is 28,000 ft. Gross weight 12,300 lb. Except for changing location of rear pit and other minor modifications, craft is faithful representation.

Fairey Spearfish

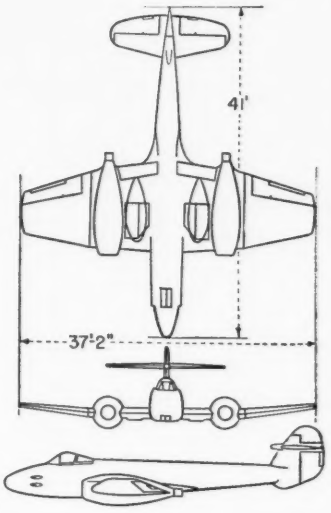
Latest Royal Navy torpedo-bomber carries missile internally, and, powered by 2,480-hp. Bristol Centaurus, is said to have 301-mph. top speed. A noteworthy feature is remote control gun turret atop fuselage. Crew numbers two. With 409-gal. fuel capacity, range is stated to be 1,050 mi. Gross weight is 21,600 lb., empty 15,200 lb. A five-blade Rotol prop is used, and engine has fan cooling. Wings are power folded, action said to take approximately 15 sec.

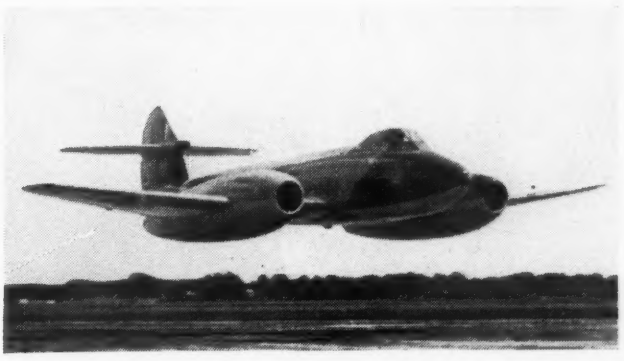


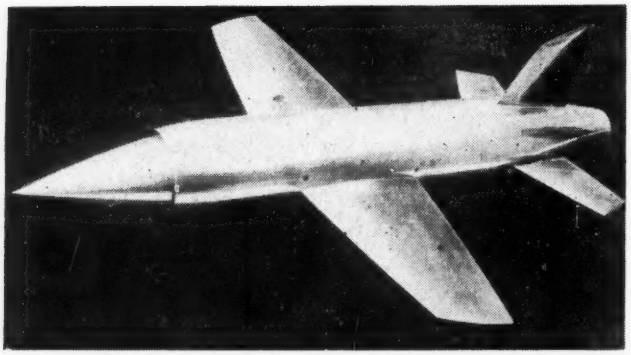


Gloster Meteor

Improved version now in service has wingtips clipped to improve rate-of-roll. Clipping does not increase top speed. With 2 Rolls-Royce Derwent V's of 3,500 lb. thrust each, top speed 580, cruising 530, and stalling 95, carrying full load. Rate of climb 7,800 fpm., while service ceiling is said to be 50,000 ft. Normal range is 910 mi. Wing area is 350 sq. ft., and gross weight 14,450 lb. Normal wing loading given as 41.4. Takeoff takes 460 yd.

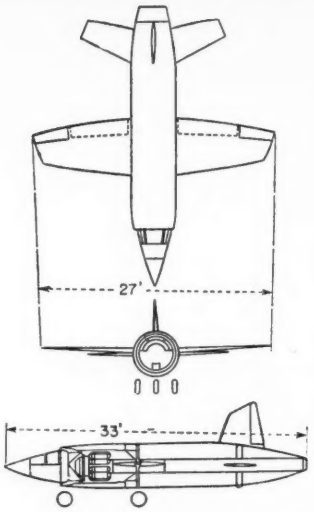


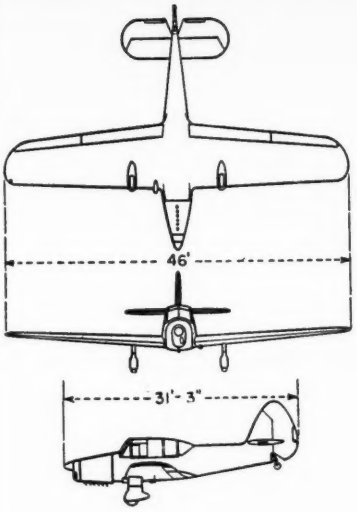




Miles E. 24/43 Supersonic

Intended as a piloted aircraft capable of attaining 1,000 mph. Among its features was a detachable pilot's cabin. Power was to be supplied by a 3-stage jet unit designed by Power Jets. First stage would be an ordinary jet engine with centrifugal blower, from which hot gases would flow to a turbine also serving as a ducted fan, with resultant mixture going through an athodyd. It's estimated that about 17,000 hp. would be available.



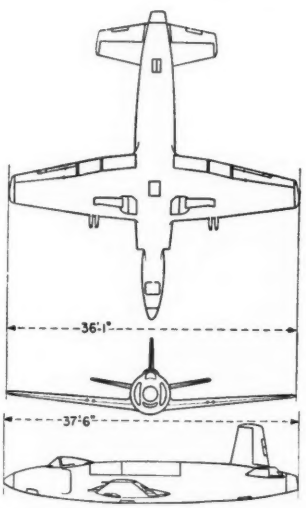


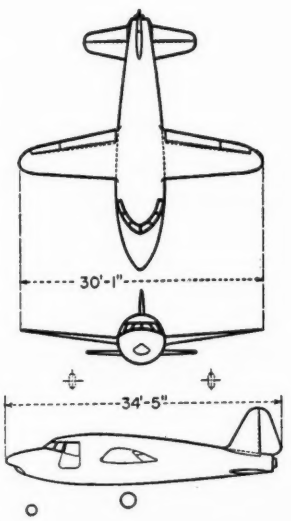
Percival Prentice

Three-place trainer powered by 250-hp. DH Gipsy Queen has top speed of 155, cruising of 143, and lands at 50. Normal range is 464 mi., service ceiling 18,000 ft., and climb 890 fpm. Construction all-metal, gross weight 3,790 lb., and empty is 2,841 lb. One pupil sits side-by-side with instructor in front pit, while another pupil sits in rear absorbing instructing and flight comments via intercom. Takeoff over 50-ft. obstacle takes 377 yd. in still air.

Supermarine E. 10/44

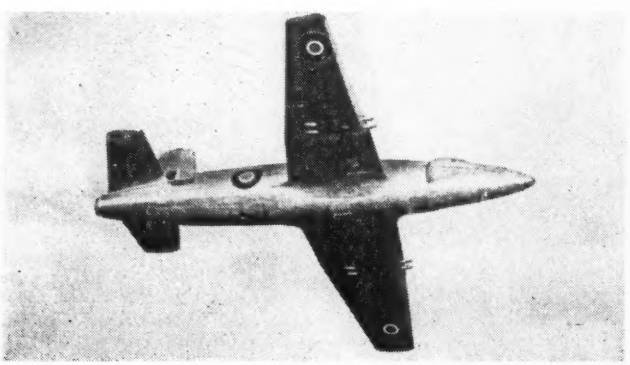
Company's first j-p fighter is powered by big 5,000-lb. thrust Rolls-Royce Nene. Interesting fact is use of conventional landing gear on jet craft. Many components of E.10/44 were adapted from piston-engined Spiteful. Of all-metal construction throughout, craft has 226 sq. ft. of wing area and normal fuel capacity of 310 gal. Up to 580 gal. can be carried using auxiliary tankage. Standard armament of four 20-mm. cannon in wings is fitted. Intakes at cockpit sides.

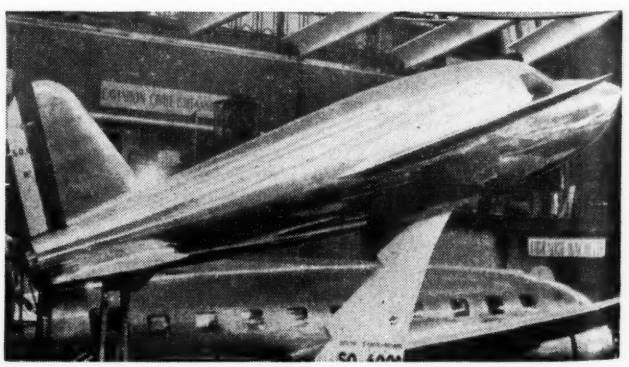




SO-6000

Several versions of this craft are underway, each powered by a different turbojet. Craft illustrated has French Rateau A.65 of 1,763 lb. thrust. Of all-metal construction, and with very wide-tread hydraulically retractable tricycle gear, it seats two, and is intended for training and research work. Entry duct is in nose. Top speed is estimated at 497, while gross weight is 8,820 lb., weight empty 3,641. Wing area is 150.6 sq. ft. Wing loading approaches 50 lb./sq. ft.





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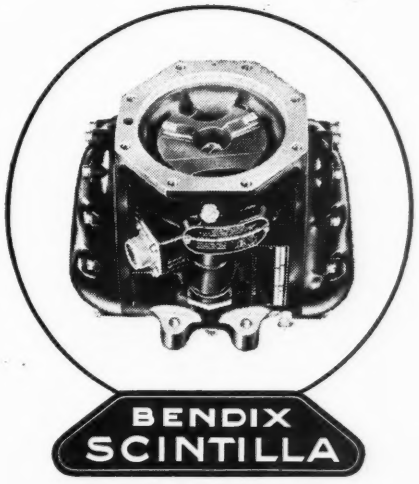

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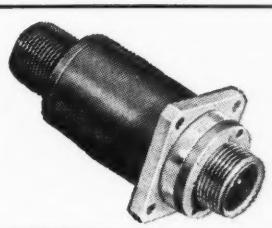

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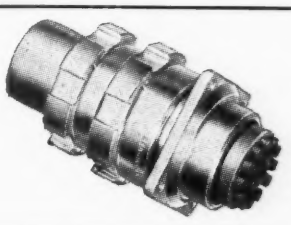

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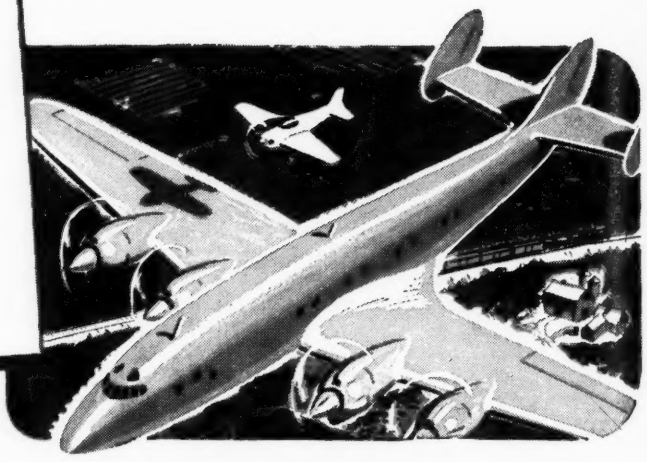

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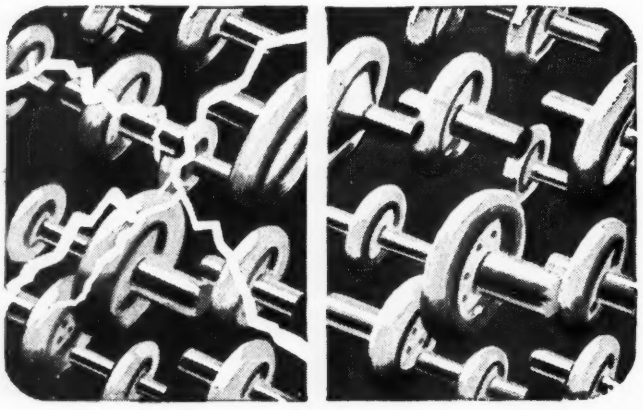

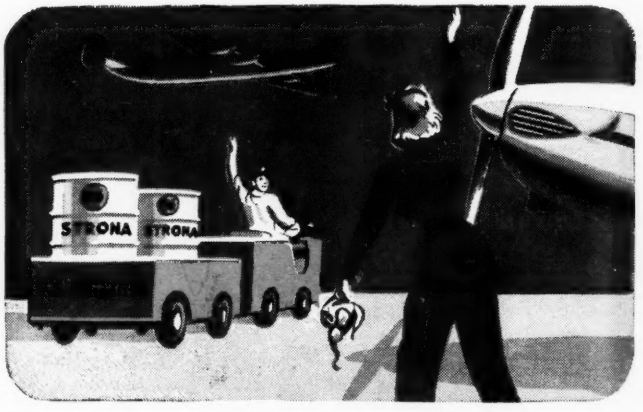

3. In severe ten-month tests conducted by a leading world airline, transports flying regular schedules were lubricated on one side with STRONA greases and on the other side with numerous regular aircraft greases. Parts lubricated with STRONA operated without grease change 7 times as long as parts using ordinary greases!

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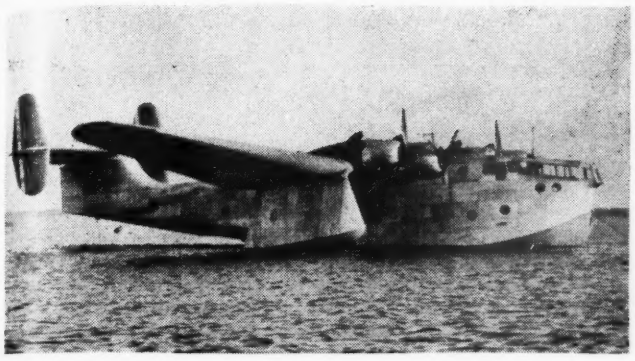
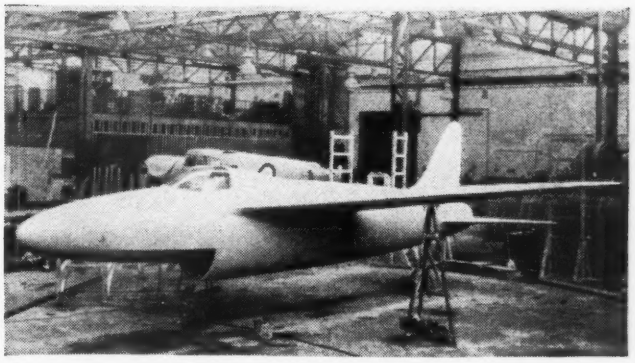
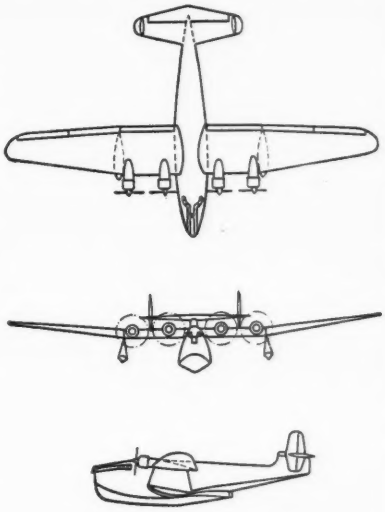
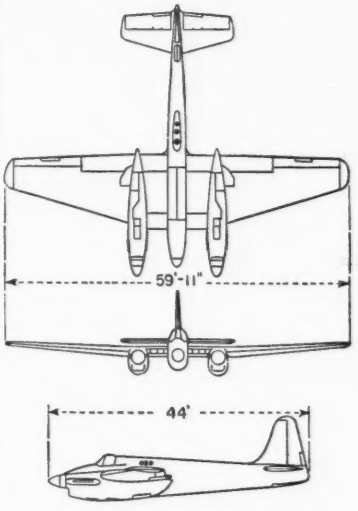




Breguet 730

Large French patrol bomber is powered by 4 Gnome-Rhones of 1,020 hp. each, and at 61,712-lb. gross weight, top speed is said to be 205 mph., and cruising speed 155, while normal range is over 2,000 mi. Empty weight is 33,480 lb., and gross wing area 1,862 sq. ft. A commercial version, designated 731, bears very similar characteristics, but has more powerful engines. Accessibility to powerplants is possible while in flight. Noteworthy feature is wing float design.





Arsenal VG-70

French high-speed research craft powered by Jumo 004 turbojet of 1,970 lb. thrust. Gross weight 6,600 lb. Highly sweptback wings. Note unusual intake under nose. Wing area 160 sq. ft.

Short Sturgeon

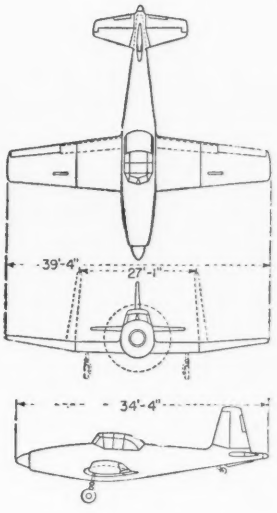
New British carrier plane seats three, is powered by two 2,080-hp. Rolls-Royce Merlins. Top speed 430 mph., range 1,600 mi. Gross weight 21,700 lb., empty 15,745. Power-operated folding wings.

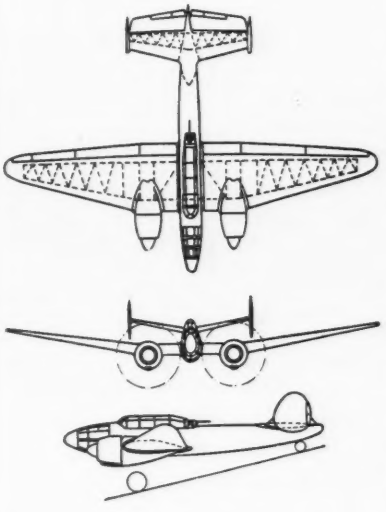
Boulton Paul P. 108

British propjet trainer is to have Armstrong-Siddeley Mamba or Rolls-Royce Dart. Construction to be all-metal. Seating three, it will train novices in modern carrier operations.

Avro Nene-Lancastrian

Modified transport has had two outboard engines replaced by two Rolls-Royce Nene turbojets of 5,000 lb. thrust each. Top speed on all four is nearly 300, and over 260 mph. on just jets.



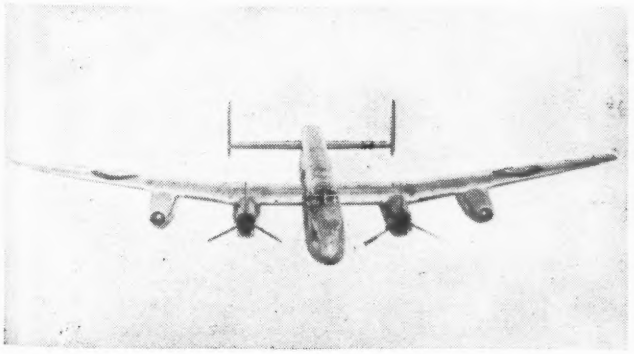


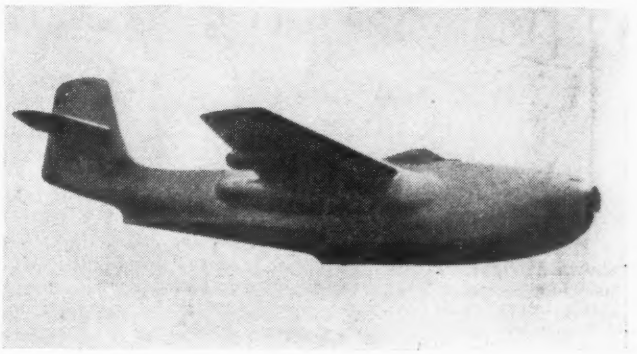
Bloch MB-175

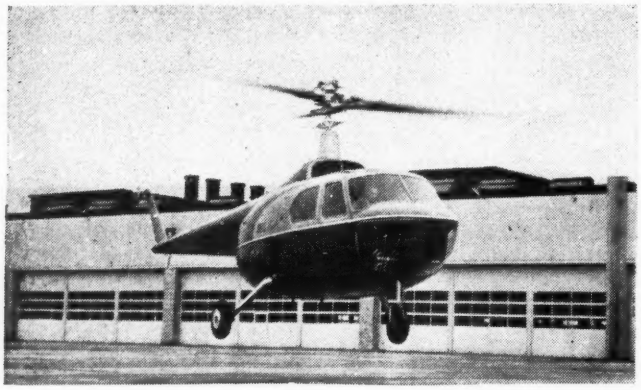
Capable of working as a light bomber, reconn., torpedo carrier, or fighter, this type is powered by 2 Gnome-Rhones, giving a top speed of 335 mph. at about 17,000 ft. As a fighter, armament consists of four cannon.

Saunders-Roe SR/A1

British single-place flying boat fighter powered by two Metrovick F2/4 of 3,500 lb. thrust each. Expected to do 500 mph. plus. Entry duct in nose, exhaust behind wing trailing edges.

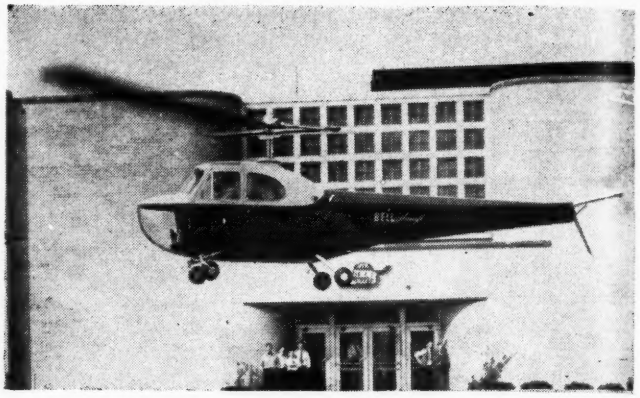






Bell Aircraft Corp. Model 42

A five-place craft developed for corporate and personal use, powered by a 450-hp. Pratt & Whitney Wasp engine. With a 65-gal. fuel capacity, its range is set at 300 mi. High speed is 125 mph., cruising is 100 and service ceiling is 13,400 ft. Using a two-blade main rotor, it features the stabilizing bar developed by Arthur Young. All-metal fuselage has luxurious automotive type interior.

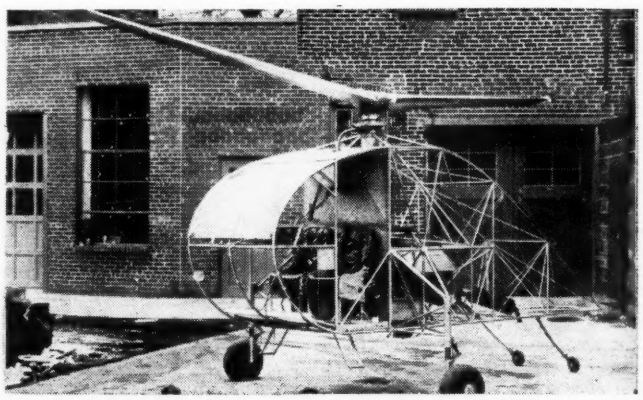


Bell Aircraft Corp. Model 47

The first helicopter to be granted a commercial license by the CAA, this two-place craft is in production—an initial schedule of 500 being slated for completion this Spring. Powered by a 178-hp. Franklin engine, it has a high speed of 106 mph., cruising speed of 86 and normal range of 216 mi. Initial climb is 1,108 fpm. and service ceiling is 11,300 ft. It is also licensed for float operation.

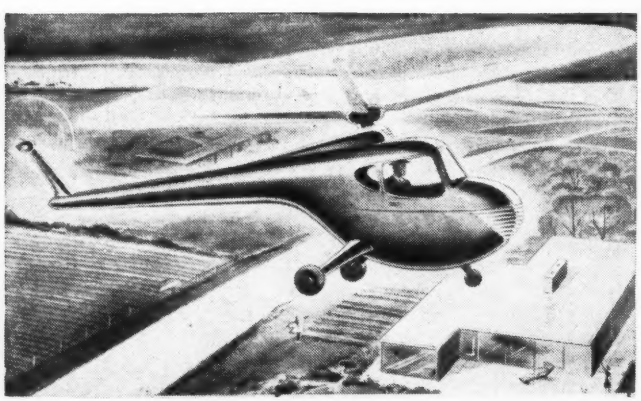
Bendix Helicopters, Inc. Model J

Designed to carry four persons or pilot and cargo load, this craft is slated for production this year in newly-built Connecticut plant. Its power plant is a 450-hp. Pratt & Whitney Wasp Jr. engine, and fuselage is all-metal construction. No performance data are available pending completion of extensive flight test program. It uses rigid contra-rotating rotor blades, eliminating anti-torque unit.



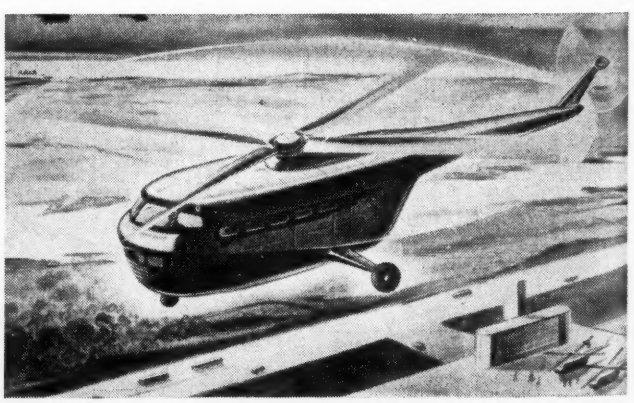
Chappedelaine

This design by Jean de Chappedelaine sponsored by the American Tool & Die Co., would utilize boundary layer control as a means of delaying stalling of rearward moving blades. By taking off boundary layer air a lower angle of attack—and consequent elimination of stall—is held possible. Also being studied is possibility of using the engine to drive a supercharger to rotate blades through jet tips.



Doman-Frasier Helicopters, Inc. LZ-1

This single-place all-metal craft is being developed largely as a flying laboratory to test design ideas for the larger HC-1 shown at right. It is possible, however, that the LZ-1 may be used for commuter-type transportation or for small-package delivery. Unlike most single-place rotary wing craft, it employs four main rotor blades, cutting down required storage area.



Doman-Frasier Helicopters, Inc. HC1

Currently in design stage, ten-place craft is to be powered by two 450-hp. engines, which would give it a cruising speed of some 95 mph. and a service ceiling of 17,000 ft. Design gross weight listed as 8,900 lb. Four-blade main rotor has 63-ft. dia., and cruising rpm. of 150. Also under development is HC-2. (See supplementary Helicopter Specifications)

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Firestone Aircraft Co. Model 45

A commercial development of the military XR-9B built for the AAF, the 45 is to be extensively test flown as a prelude to construction of a four-place craft to be designated Model 50. This two-placer is powered by a 135-hp. Lycoming giving it a high speed of over 100 mph., a cruising speed of 80 mph., an initial rate of climb in excess of 1,000 fpm.

Firestone Aircraft Co.

Now in design stage is this four-place craft which is understood to be of all-metal construction. Unusual design features include dual anti-torque rotors, which permit smaller diameter units and a consequent shortening of the craft's overall length, and use of fuselage rather than the conventional anti-torque rotor boom. No estimated performance figures available.

deLackner Helicopters, Inc.

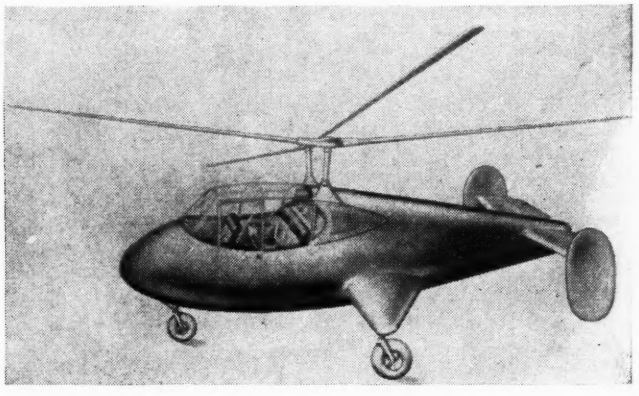
Designed for simplified production to achieve low cost, two-place craft is powered by 125-hp. Lycoming and is designed for 100-mph. high speed, 80-mph. cruising speed and 200-mi. range on 20 gal. of fuel. Rotor blades are 24 ft. dia. and have chord tapering from 8 to 5 in. With stainless steel leading edge, blades are laminated wood construction with plywood covering. Fuselage is fabric-covered steel tubing.

Helicopter Engineering & Construction Corp. Model 100

An experimental unit designed to carry pilot and 200 lb. of cargo over normal range of 150-160 mi. at 80-mph. cruising speed. Powered by 75-hp. Lycoming engine with exhaust induced cooling which eliminates need for blower and saves 5-7% power. Design high speed 100 mph., maximum vertical climb 650 fpm., maximum rate of climb 1,200 fpm., and auto-rotation rate of descent is 33 ft. per sec.

Gazda Engineering Helicospeeder

Originally designed with a composite power plant: a reciprocating engine for lifting and hovering power and a turbojet for forward flight and torque compensation, this latter for diverting exhaust gases through side jets as needed. Recently, however, the small pusher propeller has been added, possibly driven by the rotor-driving engine with torque compensation coming from engine exhaust.



Kaman Aircraft Corp. K-125A

A three-place craft now undergoing flight test but on which no performance data are available. Intermeshing dual rotors appear to be of rigid blade type and fixed wing aircraft-type stabilizer and elevators are installed with fixed vertical stabilizers. Company reports that "radically simplified design requires a low cost power plant with corresponding low cost maintenance." A fixed tricycle landing gear is fitted.

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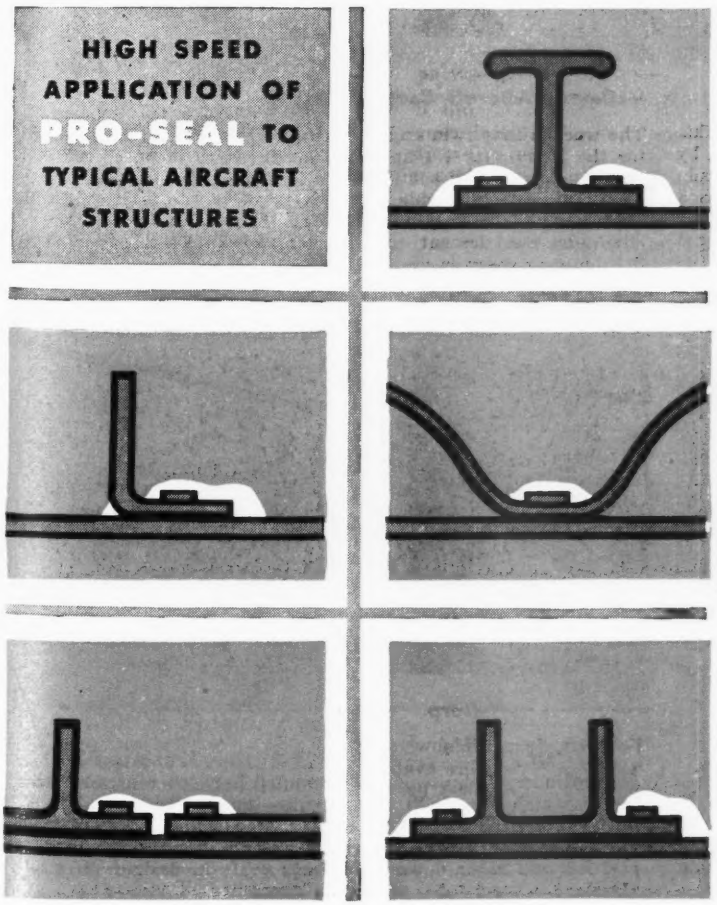

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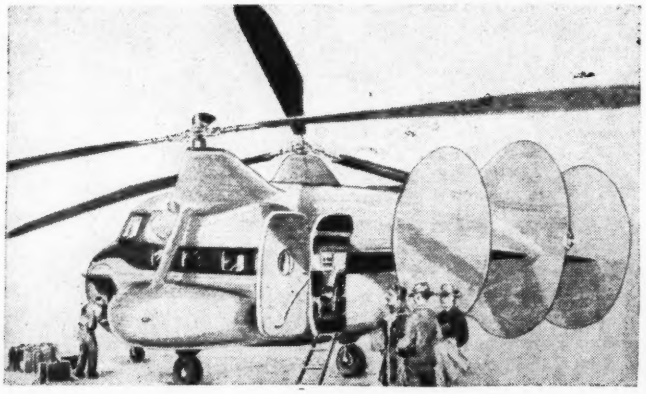


Kellett Aircraft Corp. KH-2

Designed for short haul operations, this twin engine craft can be adapted to ten passengers or a ton of cargo, with pilot and co-pilot. Powered by two 550-hp. Continentals, design high speed is 118 mph., cruising speed is 90 mph. and normal range 180 mi. Gross weight is given as 11,600 lb., weight empty, 8,658 lb. Intermeshing contra-rotating rotor blades eliminate need for anti-torque rotor.

Kellett Aircraft Corp. XR-8

Predecessor of XR-10 and commercial KH-2, developed for Army Air Forces, it was first military 'copter to utilize intermeshing rotor blades. A two-place craft built for observation liaison and rescue work, it is powered by a 245-hp. Franklin engine giving a high speed of 104 mph., a cruising speed of 85 and initial rate of climb of 1,250 fpm. Main rotor blades have 36-ft. diameter.

Landgraf Helicopter Co. H-2

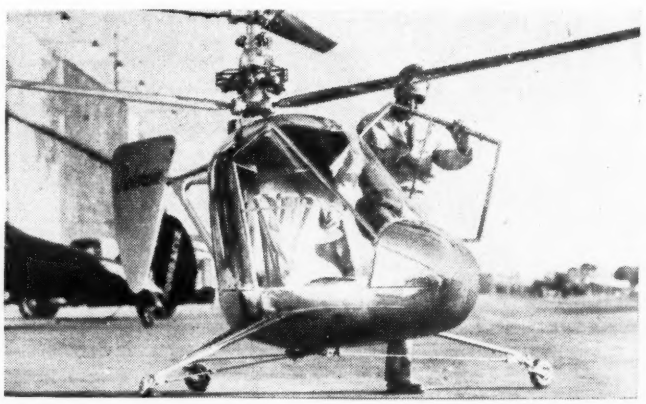
Second type developed by the company for testing by AAF, this single-place craft features retractable landing gear. Powered by a modified 85-hp. Pobjoy engine, its high speed is over 100 mph. All-wood construction, including contra-rotating rotors which have solid spruce spars and plywood covering. Unlike most rotary wing craft, blade angle is changed by ailerons placed near rotor tips.

McDonnell Aircraft Corp. XHJD-1

The world's first twin engine helicopter, now being flight tested for the Navy. Its 450-hp. P&W engines are mounted midway on pylons extending out from the fuselage to rotor hubs. Overrunning clutches provide for delivery of power to both rotors even though one engine is cut out. Contra-rotation of rotors eliminates need for anti-torque rotor. Useful load is over 3,000 lb. Cruising speed is over 100 mph.

Piasecki Helicopter Corp. XHRP-1

Now being flight tested by the Navy, for which it was designed for liaison and rescue work. It carries a crew of two and ten passengers, the same as proposed commercial version designated PV-3. Powered by Continental Wright R-975 of 450 hp. driving tandem contra-rotating three-blade rotors. Gross weight 6,700 lb. Fuselage welded steel tube, fabric covered.



Roteron, Inc. XM-1

Five-cylinder, 25-hp. engine is mounted between contra-rotating rotors, which are of different lengths—top blades being 4 ft. 10 in. long; bottom being 7 ft. 8 in. Rotor blades are solid laminated maple. Rudder swings from vertical to semi-horizontal position and rotor downwash heads craft in desired direction. Fuselage is steel tube, aluminum covered.

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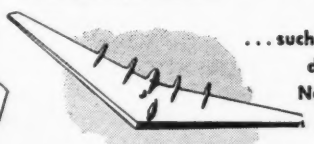

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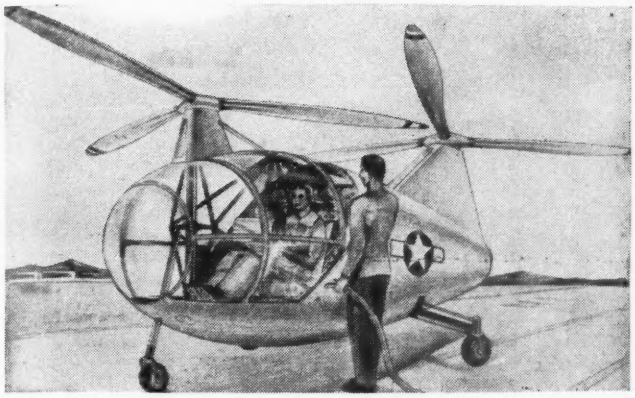


Rotor-Craft Corp. XR-11 Dragonfly

Two-place experimental craft under development for Army Air Forces, featuring contra-rotating tandem rotors of 18-ft. diameter, having total blade area of 18 sq. ft. Power plant is a 100-hp. Continental, but performance data have not been made available. Fuselage is of welded steel tubular construction, fabric covered. Gross weight approximates 1,100 lb. and empty weight about 700.

Sikorsky Aircraft R-5A

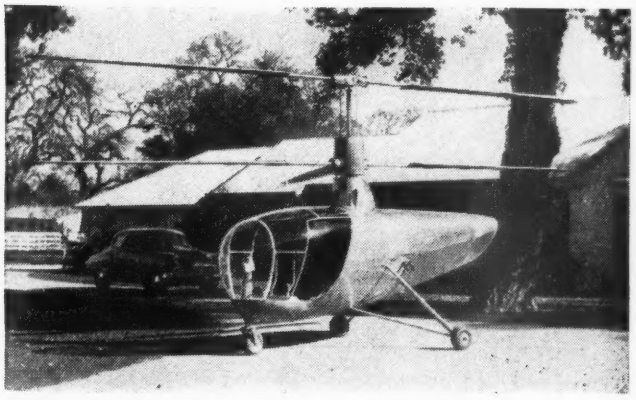
Normally a two-place observation-liaison craft, it can also carry a stretcher case on each side of fuselage in rescue work. It has lifted crew of two and 16 other people in tests. Powered by 450-hp. P&W Wasp, high speed is 112 mph., cruising speed is 80, initial climb 870 fpm., and service ceiling 14,100 ft. Gross weight is 4,896 lb., weight empty is 3,781 lb.

Sikorsky Aircraft S-51

Developed from the military R-5 (above, right), this commercial craft has participated in recent Post Office experimental mail delivery projects and is seeing service in non-scheduled passenger operations. Accommodations are provided for pilot and three passengers. Powered by a 450-hp. P&W Wasp Jr., it has a sea level high speed of 103 mph. and cruising speed of over 80 mph.

Sikorsky Aircraft S-52

New two-place personal-executive 'copter offering, for the first time, all-metal main rotor blades as standard equipment. Designed for "life-of-the-ship" performance they consist of extruded leading edge to which are riveted trailing edge sections of 6-in. length. Design high speed, with 178-hp. Franklin engine, is 105 mph., cruising speed is 90, climb 1,500 fpm. and service ceiling is listed as 16,000 ft.

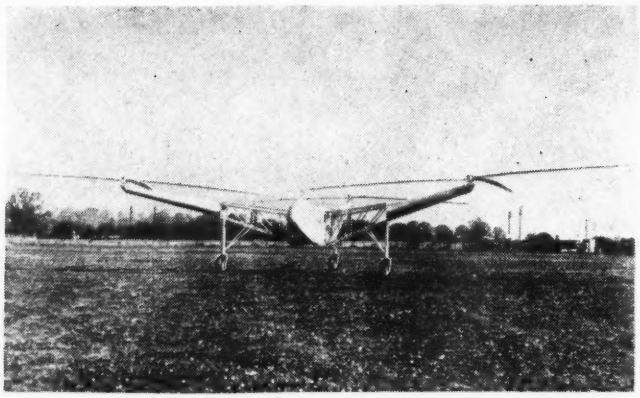


United Helicopters, Inc., Commuter

Developed by Stanley Hiller, Jr., youthful pioneer of co-axial type rotary wing aircraft, new Commuter was scheduled for first public appearance about the time of this issue. Powered by 135-hp. Lycoming, it is designed for high speed of 90 mph., cruising speed of 75, 950-fpm. climb and service ceiling of 12,000 ft. Its 33-ft. diameter rotor blades are laminated wood.

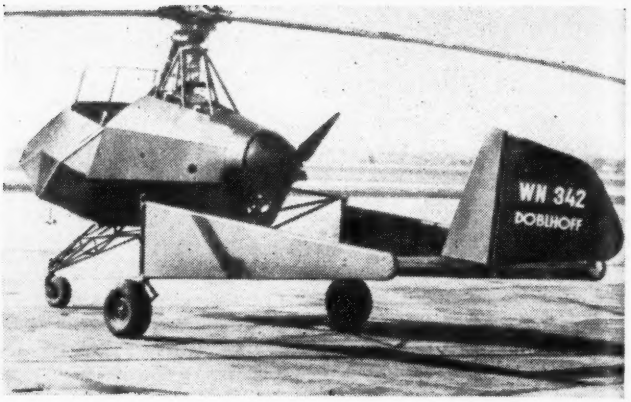
Cierva-Weir 9

An experimental research craft with three-bladed main rotor, in which directional control is achieved by jet reaction. This force is developed by exhaust of the de Havilland Gipsy Queen engine and slipstream from its cooling fan, and is controlled through the pilot's rudder pedals by varying the incidence of the fan blades. No performance figures are available.



Cierva Autogiro Co. Air Horse

Designed especially for crop dusting, English craft is being built by Cunliffe-Owen Aircraft for Pest Control, Ltd. Three three-bladed rotors are used to increase payload, as a gross weight of 15,000 lb. is the goal. Blades are of composite aluminum and resin bonded plywood construction, and cruise at 175 rpm. It is powered by a Rolls-Royce Merlin 32.

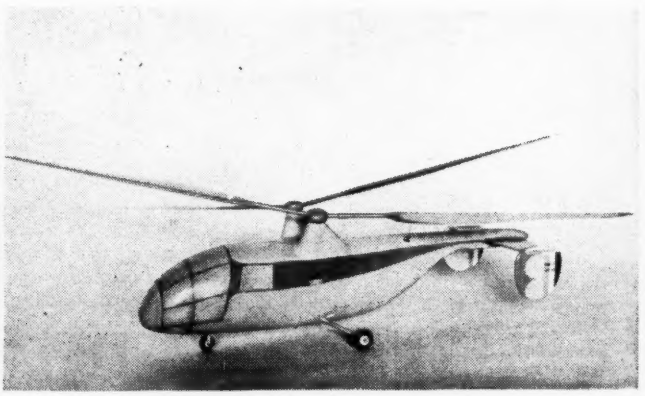


Doblhoff

An experimental German craft brought to this country for study by the AAF. Particularly interesting are jets at rotor tips despite fact that craft has conventional power plant which also drives a small propeller to give forward speed. The twin booms, with stabilizing surfaces, supporting conventional airplane rudder, were probably to give added stability during tests.

Fairey Aviation Co. FB-1 Gyrodyne

Photo is of model of a new English research project now under construction. A four-place craft, it is designed to combine both autogyro and helicopter features, as forward motion will be imparted by conventional propeller mounted on boom at fuselage side. Lower rotor blade pitch is said to be possible with this arrangement. Military and commercial versions are planned.



SNCAC NC-2001 Abeille (Bee)

This five-place French feederline project is designed for fully retractable tricycle landing gear. Rigid contra-rotating intermeshing rotor blades have decided outward slant to give clearance. Note lifting area set well out from hubs. It is powered by a 450-hp. 12S Renault 12-cylinder, aircooled inverted V engine. Prototype has been displayed publicly, but it is not known if it has flown yet.

SNCASO SO-1100

A unique French combination helicopter-gyro craft in which the 170-hp. aircooled Mathis engine acts as a compressor to turn the rotor blades through jets at the tips, and to drive a conventional three-blade fixed pitch propeller for forward motion. Besides the fixed vertical fins set at tips of horizontal stabilizers, a conventional rudder is attached to shroud ring.

Omega

Two place twin-engine, twin-rotor 'copter developed in Russia by I. P. Bratuchin, which has several design features similar to those employed in German's early Focke-Achgelis units. It is said to have reached a high speed of between 112 and 118 mph. It is not known if an over-drive is provided for single engine operation, but such does not appear to be the case.

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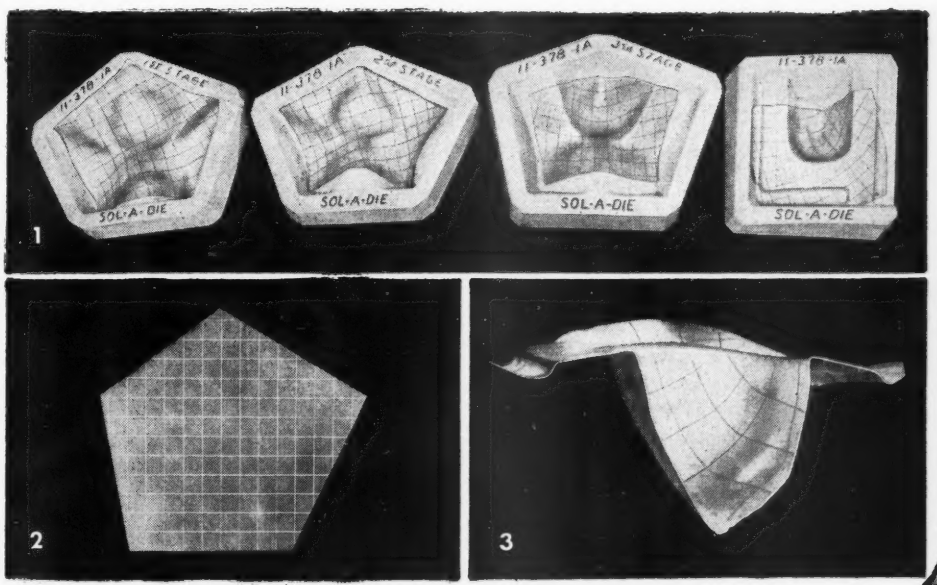

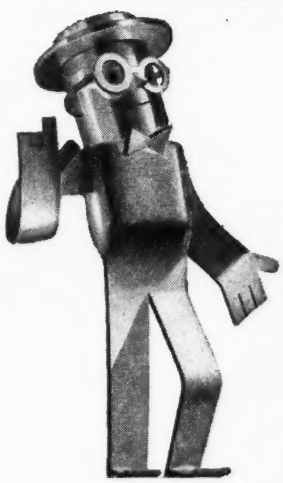

Photo #1 above shows a complete set of Sol-A-Die patterns. This set was used to stamp the gridded stainless steel sheet (photo #2) into the final part (photo #3). Note the minimum deformation indicated by the slight variation of the grid lines.

For complete details, write now for your complimentary copy of Solar's folder: "The Sol-A-Die Process." Write Solar Aircraft Company, 2206 Pacific Highway, San Diego 12, California.

SOLAR

STAINLESS PRODUCTS

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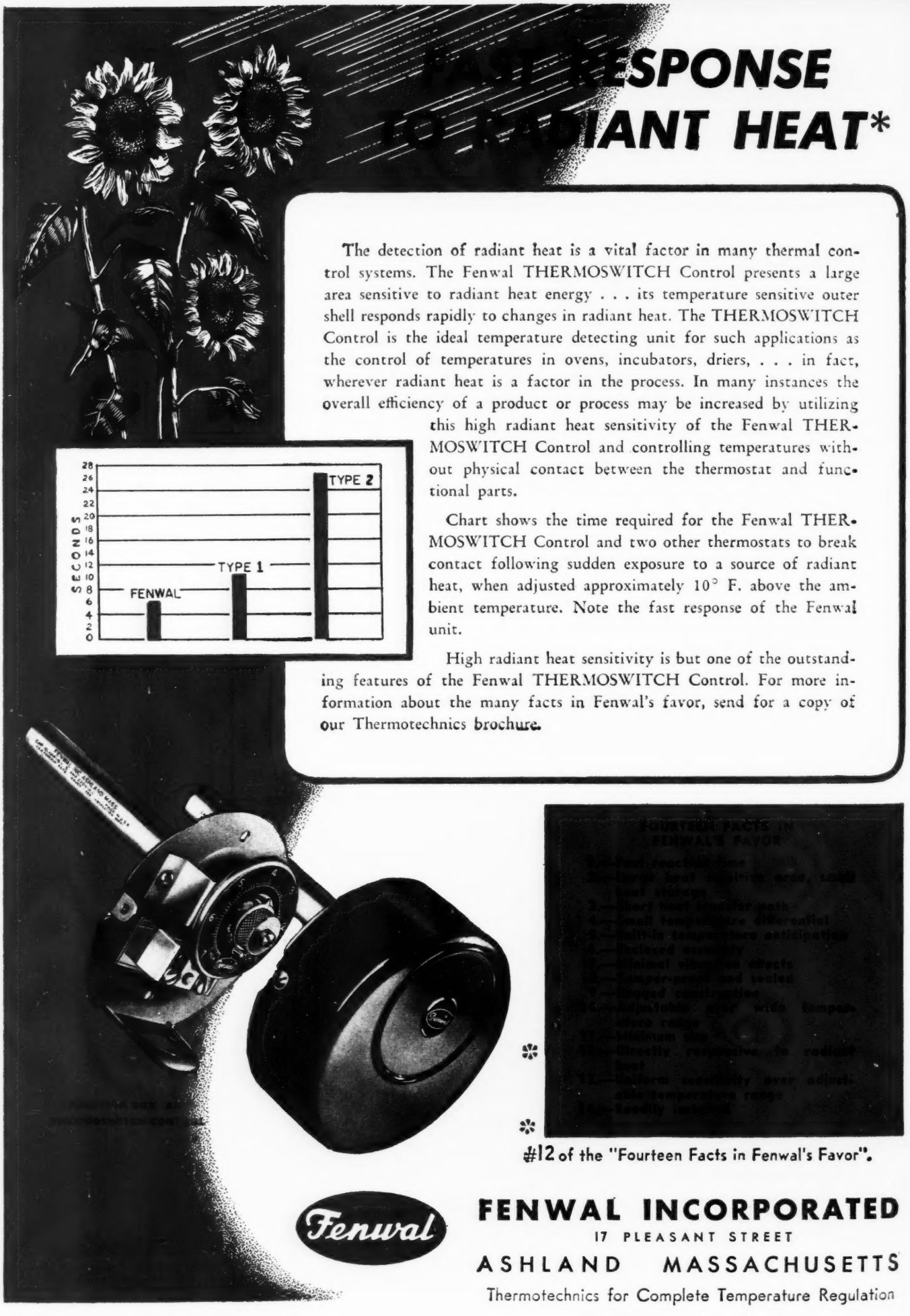
FAST RESPONSE
TO RADIANT HEAT*
The detection of radiant heat is a vital factor in many thermal control systems. The Fenwal THERMOSWITCH Control presents a large area sensitive to radiant heat energy . . . its temperature sensitive outer shell responds rapidly to changes in radiant heat. The THERMOSWITCH Control is the ideal temperature detecting unit for such applications as the control of temperatures in ovens, incubators, driers, . . . in fact, wherever radiant heat is a factor in the process. In many instances the overall efficiency of a product or process may be increased by utilizing this high radiant heat sensitivity of the Fenwal THERMOSWITCH Control and controlling temperatures without physical contact between the thermostat and functional parts.
SECONDS
28
26
24
22
20
18
16
14
12
10
8
6
4
2
0
FENWAL
TYPE 1
TYPE 2
Chart shows the time required for the Fenwal THERMOSWITCH Control and two other thermostats to break contact following sudden exposure to a source of radiant heat, when adjusted approximately 10° F. above the ambient temperature. Note the fast response of the Fenwal unit.
High radiant heat sensitivity is but one of the outstanding features of the Fenwal THERMOSWITCH Control. For more information about the many facts in Fenwal's favor, send for a copy of our Thermotechnics brochure.
FOURTEEN FACTS IN FENWAL'S FAVOR
#12 of the "Fourteen Facts in Fenwal's Favor".
Fenwal
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17 PLEASANT STREET
ASHLAND MASSACHUSETTS
Thermotechnics for Complete Temperature Regulation

New Aero Progress Revealed At IAS Technical Sessions

Institute's second postwar annual meeting convenes specialists who cover wide range of advances in design, aerodynamics, structures, propulsion, flight test, meteorology, transport, and rotorcraft . . . Given here are brief summaries of presentations, with title-and-author notations for ready reference.

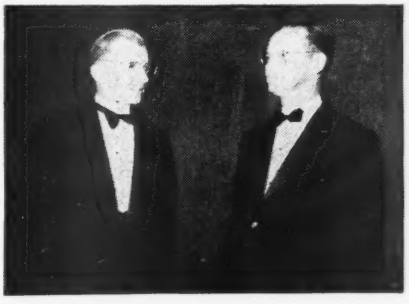
EVOKING NOTABLE INTEREST at 15th Annual Meeting of the Institute of Aeronautical Sciences in New York, Jan. 28-30, were the three papers presented at the Aircraft Design sessions—*Development of P-80A Jet Fighter Airplane* and Parts I and II of *High-Speed Research With XS-1 Airplane.*

Highlight of P-80 Shooting Star presentation by Lockheed's C. L. Johnson, was description of air inlet duct installation. Confronted with phenomenon of loud organ-pipe tone audible on ground when craft was at considerable height, origin was finally traced to uneven airflow around ducting to engine. Accordingly, ducts were redesigned to embody boundary layer bleed arrangement bypassing slow-moving low-energy air to give normal ram curve. Explained, too, was how side ducting simplified armament installation in fuselage nose.

Also revealed were details of emergency fuel system, for feeding directly into fuel manifold; advantages and problems of water injection: thrust requirement to go from Mach .7 to .8: cockpit cooling turbine unit to insure pilot comfort, fuselage dive brake to effect recovery from compressibility speed ranges; detachable fuselage section for power plant access; and surface finish deterioration after 2-min. high speed contact with rainstorm, which resulted in 10% speed reduction. Among major jet-craft factors listed as requiring further development were avigation and low-visibility landing facilities, takeoff performance, crew-escape, anti-flutter devices, fire detection and extinguishing means, windshield and canopy defrosters, and fillers and paints.

Part I of XS-1 presentation, by W. C. Williams and R. W. Byrne, Langley Memorial Lab., NACA, was concerned with research objectives and instrumentation. Described as a piloted craft designed to traverse transonic range for investigation of compressibility effects, two phases of research flights were specified—(1) exploratory, to define operational limits, followed by (2) detailed investigation of aerodynamic loads. For each increase in Mach increment, stability and control are to be observed. Flights, now progressing, were explained as preliminary demonstrations. Directional stability of craft was described to be about three times that of conventional plane. Also outlined were various instrument components to be utilized, together with explanation of numerous precise measurements required.

Part II of XS-1 discussion, by R. M. Stanley and R. J. Sandstrom, was concerned mainly with design features of craft. Rocket power plant—four 1,500-lb. thrust units, using alcohol and liquid oxygen propellant and giving good specific impulse—was stated to be regeneratively cooled. Discussed also were various propellants initially under consideration—hydrogen peroxide, acid and analine, gasoline and liquid oxygen, and other combinations—and reasons were given for their rejection. Order of propellant tank supply consumption to maintain craft C.G. was outlined. Wing skin was designated as 75 ST, fuselage (semi monocoque) as 24 ST.



At Honors Night gathering, preceding IAS technical sessions, were Preston R. Bassett (left), Sperry Gryoscope pres., and Douglas V.-P. Arthur E. Raymond (right), whom he succeeds as pres. of Institute.

Cockpit was described as sealed compartment, designed to lose not more than 1 psi. per hr., with pilot access through fuselage door. Double glazed plate glass windshield was specified to incorporate silica gel, pilot also exhaling through apparatus containing silica gel.

Landing gear and flaps were specified as pneumatically operated.

Test flight condition for attained Mach number near lower transonic limit, was outlined.

Method of attachment to Boeing B-29 mother ship was explained: XS-1 is placed in a pit, next the B-29 is rolled over pit, then smaller craft is hoisted partly into B-29's bomb bay, and hookup is effected via standard bomb shackles.

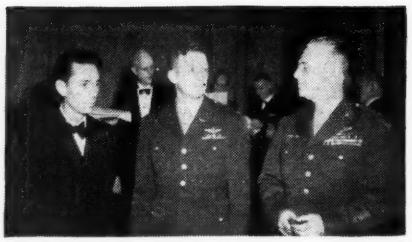
Papers presented at Structures session included: *Critical Speeds of Shafts Under Torque*, by R. M. Rosenberg, Purdue Univ., covering exact analysis of this problem, necessary to satisfy differential equations involved, supplemented by approximate solution relying on Raleigh's principle of energy equilibrium: *Dynamics of Swept Wing*, by H. R. Lawrence, A. T. Zahorski, and W. E. Cox, Northrop, assuming that this airfoil configuration may be represented dynamically by a plane-curved rod of variable section with finite stiffness in torsion and in bending normal to its plane: *Computation of Influence Coefficients for Aircraft Structures With Discontinuities and Sweepback*, by S. Levy, National Bureau of Standards, outlining general method for computing coefficients, using Castigliano's theorem together with stress analysis of airplane structure based primarily on equilibrium condition; *Numerical Methods for Calculation of Elastic Instability*, by B. A. Boley, Polytechnic Inst. of Bklyn., developing three numerical methods — determinant, convergence, and energy—for evaluation of buckling loads, requiring operations table similar to that used in Southwell's relaxation procedure; *Column Characteristics of Sandwich Panels Having Honeycomb Cores and Metal Faces*, by W. W. Troxell and H. C. Engel, Martin, developing theory of column behavior, which considers core shear rigidity and reduced elastic properties of face material at stresses above

elastic limit, and showing accord with experimental data; and *Inelastic Column Theory,* by F. R. Shanley, Lockheed, analyzing column action in plastic range, basis being that bending may proceed simultaneously with increasing axial load.

Included in Rotating Wing Aircraft session were: *Notes on Helicopter Development,* by I. I. Sikorsky, Sikorsky Aircraft Div., United Aircraft Corp.; *Mechanical Instability of Two-Blade Helicopter Rotor on Anisotropic Supports,* by R. Coleman and A. M. Feingold, Langley Memorial Lab., NACA, presenting case of one or two blades on unequal supports, involving equations of motion having periodic coefficients; *CAA Testing of Helicopters,* by R. B. Lightfoot, Sikorsky Aircraft Div., United Aircraft Corp., determining performance by methods similar to those used on conventional aircraft, and establishing methods to correlate power, gross weight, rotor speed, forward speed, altitude, and temperature by accounting for transmission efficiency, changes in profile drag with mean lift, and parasite drag with speed; and *Helicopter Power-Plant Installations,* by R. A. Wolf and C. P. Spiesz, Bell, dealing with basic performance, submerged installations, cooling and induction systems, suspension systems, fuel and oil systems, and engine accessories.

Presented at the Flight Test session were: *Progress in Dynamic Stability and Control Research,* by W. F. Milliken, Jr., Cornell Aeronautical Lab., emphasizing broad aspects of Cornell program, integration of specific aspects, utilization of data in plane and missile design, and contemplated developments; *Raydist—Precision Radio Navigation and Tracking System,* by C. E. Hastings, Hastings Instrument Co., explaining highly accurate and sensitive electronic distance measuring system where precise determination of position is required; and *Flight Testing of Guided Missiles,* by H. K. Cheney, Consolidated, treating of general problem of missile flight testing, by comparing operating conditions to those of piloted craft.

Read at first Aerodynamics session were: *Use of Damping Screens for Reduction of Wing-Tunnel Turbulence,* by H. L. Dryden and G. B. Schubauer, National Bureau of Standards, presenting experimentally confirmed theory that intensity of turbulence is reduced in one ratio for single screen and by different ratio for identical screens in series; *Method for Calculating Airfoil Sections from Specifications on Pressure Distributions,* by G. H. Peebles, Douglas, investigating W. Mangler's solution to problem in



Cited for 1946 attainments at Honors Night dinner (l. to r.): Aerodynamicist Robert T. Jones, NACA Ames Aeronautical Lab., winner of Sylvanus Albert Reed award; Col. Leighton I. Davis, AMC Armament Lab., given Thurman H. Bane award; and Brig. Gen. Malcolm C. Grow, AAF air surgeon, recipient of John Jeffries award.

theory of conformal transformations, and showing that by changing approach and devising accurate and fast performance of lengthy calculations, notion of constructing airfoil section to give prescribed pressure distribution can be made to yield excellent tool for design; and *Subsonic and Supersonic Flow About Slender Bodies,* by E. V. Laitone, Cornell Aeronautical Lab., affording new first and second order solutions for subsonic and supersonic flow about bodies of revolution.

Presented at the second Aerodynamic session were: *Laminar-Boundary-Layer Oscillations and Stability of Laminar Flow,* by G. B. Schubauer and H. K. Skramstad, National Bureau of Standards, giving account of results of investigation conducted in Bureau's 4½-ft. wind tunnel, in '40 and '41, and detailing experimental agreement with Tollmien-Schlichting stability theory; *Linearized Treatment of Supersonic Flow Through and Around Ducted Bodies,* by H. F. Ludloff, New York Univ., further developing, then employing, methods of distributed "sources and sinks," first applied by von Karman and Moore to supersonic flow problems; *Oscillating Air Forces and Flutter at Supersonic Speeds (Two-Dimensional Case),* by I. E. Garrick, Langley Memorial Lab., NACA, giving account of determination of forces on oscillating airfoil moving forward in supersonic field, with particular reference to method of Possio; and *Aerodynamic Performance of Delta Wings,* by H. J. Stewart and A. E. Puckett, Caltech, concerning results of investigation of drag and lift of delta wings with straight trailing edges as extended to delta wings with sweptback or swept-forward trailing edges.

Offered at Meteorology session were: *Pressure Measurements in UpperAtmosphere,* by N. R. Best, Naval Research Lab., discussing direct measurements of pressures corresponding to heights of 60-85 km. by use of V-2 Rockets at White Sands, N. M.; *Future Role of Rapid Computing in Meteorology,* by J. von Neumann, Princeton Univ., concerning electronic automatic computing to furnish speed in equation calculations; *Discussion of Possibility of Weather Control,* by V. K. Zworykin, Radio Corp. of America, discussing contemplated electronic computing devices constituting miniature models (with greatly accelerated time scale) of our atmosphere and factors influencing it; and *New Operational Basis for Weather Forcasting,* by B. G. Holzman, Hq. AAF, concerning separation of weather data analysis from forecasting activity to afford immediate increase in forecast efficiency and create firm basis upon which private meteorology can be established.

Presented at Aircraft Propulsion sessions were: *Survey of Calculated Performance of Jet Power Plants,* by J. H. Keenan and J. Kaye, MIT, studying future power plant element-combinations for effect of certain major variables; *Performance Charts for Jet Propulsion System Consisting of Compressor, Combustion Chamber, and Turbine,* by B. Pinkel and I. M. Karp, Cleveland Lab., NACA, affording convenient data for computing thrust, fuel consumption, and other performance values of turbojet for any given set of operating conditions and component efficiencies; and *Selection and Design of Rocket Power Plants,* by W. C. Roberts, Bell, presenting factors pertinent to selection of propellant, also details of fuel system types and rocket engine design.

Read at the Air Transport session were: *The Flying Boat and Its Commercial Uses,* by P. G. Masefield, Ministry of Civil Aviation, Great Britain; *Radio Aids to Navigation,* by D. M. Stuart, CAA, treating of devices in short-distance and instrument landing classes, lately adopted by PICAO; *Effect of High-Speed Fueling on Aircraft Design,* by E. Olsen, Wayne Pump Co., concerning establishment of requirements for rapid refueling as affecting plane design, evaluation of problems presented by requirements, data pertinent to practical solution of problems and, finally, conclusions and recommendations; and *Transport Problems with Turbine Power Plants,* by F. W. Kolk, American Airlines, considering operational aspects, including mechanical reliability of engines and control apparatus, ability of power plants to operate under icing conditions, ability to operate at low speeds and low altitudes with low fuel consumption, and availability of suitable inexpensive fuel.

Outlook for '47

(*Continued from page* 66)

a major part in the business of most aircraft companies, but there will be some outstanding exceptions where production of selected supplementary products will contribute substantially to maintaining higher and more economical levels of business volume for the concerns so engaged. (Gladser Studio photo)

P. R. Bassett, Pres., Sperry Gyroscope Co.—This country pinned its greatest hope on the airplane as the most potent weapon with which to defeat our enemies. We backed up that decision by tremendous research, engineering, and industrial effort. It was successful.

The resulting advancement of the art is amazing, but it is far from being properly digested. What research has started, only research can finish.

As our aircraft increase in size, power, speed, and range, those of us responsible for instrumentation are faced with new challenges at every turn. Such challenges must be met with ever-widening programs for research and development.

H. M. Horner, Pres., United Aircraft Corp.—The progress in 1947 of our corporation will depend largely on three outside factors, in addition to our own efforts. One of these, of course, is military procurement. We believe that national security depends to a major extent upon air power, and air power can be maintained only through a military procurement program of sufficient size to insure an adequate air force for immediate defense and to insure a healthy industry which can expand rapidly and efficiently in case of an emergency.

Second factor is the growth and progress of commercial aviation. Air tranportation, like the aircraft manufacturing industry, has faced great problems in converting to peacetime activities and in expanding to meet the mushrooming requirements of a suddenly air-conscious public. Despite the magnitude of their job, the airlines in 1946 carried more passengers and cargo greater distances at higher speeds than ever before. In 1947 they will put into service large numbers of new postwar transport aircraft, and with this new equipment we believe they will further improve both the quality and the volume of their service.

Third—and most important—factor is the general state of the nation. Our industry is dependent for its existence on many others—steel, aluminum, coal, oil, machine tools—as well as upon thousands of subcontractors, large and small, scattered throughout the country. We can progress and prosper only as fast as the nation as a whole moves toward more stabilized management-labor relations and thus toward uninterrupted production.

If these things all work out reasonably well, we believe that United Aircraft will turn the corner into reasonably satisfactory peacetime opera-

(*Continued on page* 132)

Stainless Bars in Stock

Allegheny Quality—Ryerson Service

Contact Ryerson for prompt shipment of Allegheny Stainless bars. Diversified stocks and expert technical assistance in determining the type of stainless best suited to your needs are available at all twelve Ryerson plants.

Rounds, squares, hexagons, flats—whatever your stainless bar requirements, Ryerson is prepared to supply the analysis that will perform the best under any condition of service.

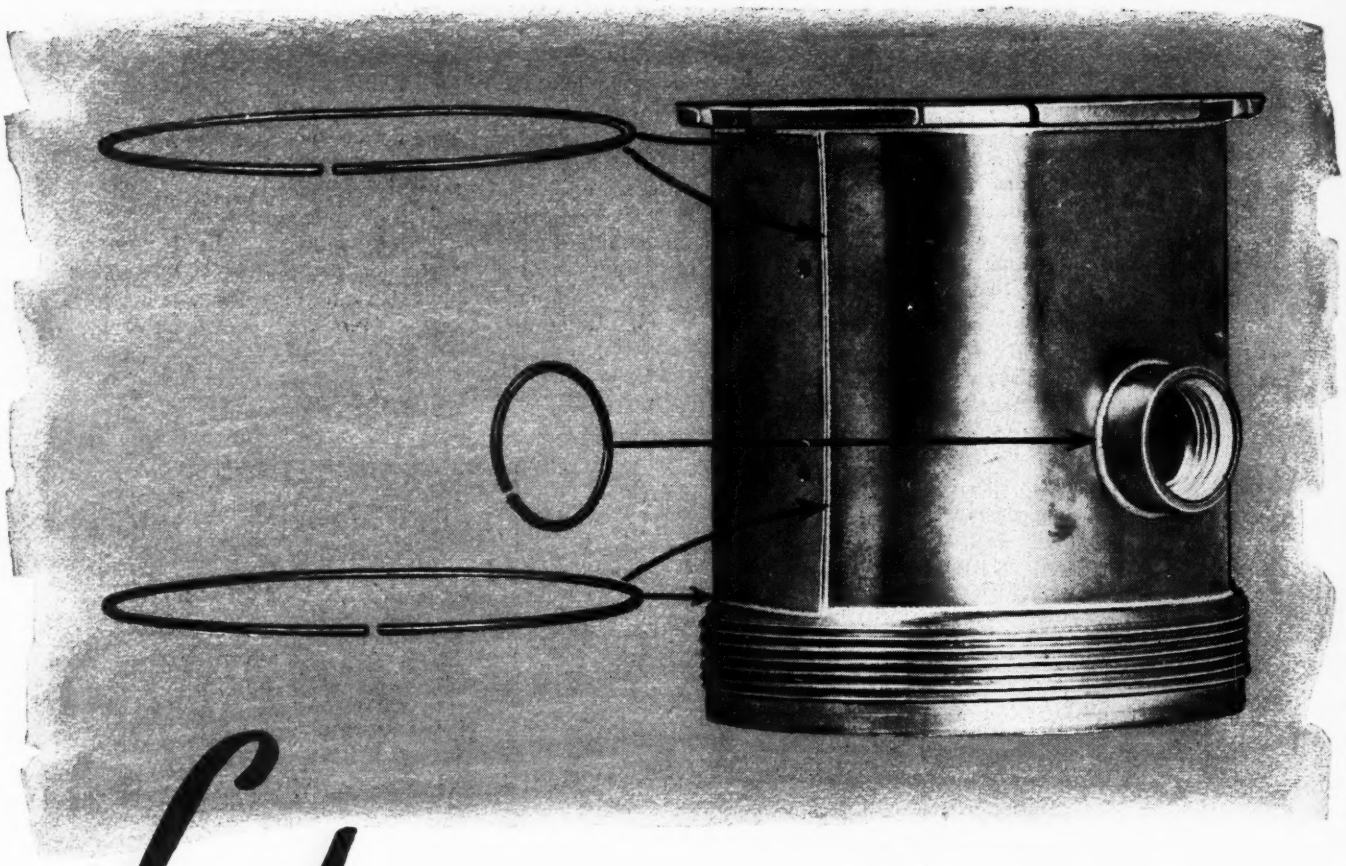
Successfully meeting the stainless requirements of industry for more than 20 years, our men are always ready to give you the benefit of their specialized experience. Whether your requirements are large or small, you will always receive prompt, personal attention.

Utilization of Ryerson's *complete* stainless stocks assures quick, dependable service. So, write, wire or phone your nearest Ryerson plant for prompt action on Allegheny Stainless bars.

Joseph T. Ryerson & Son, Inc. Steel-Service Plants: New York, Boston, Philadelphia, Detroit, Cincinnati, Cleveland, Pittsburgh, Buffalo, Chicago, Milwaukee, St. Louis, Los Angeles.

Other Allegheny Stainless Products in Stock: Plates • Sheets Angles • Seamless Tubing • Seamless and Welded Pipe Pipe Fittings • Welding Flanges • Bolts • Screws • Rivets, etc.

RYERSON STEEL



Look WHAT THREE LITTLE RINGS OF *EASY-FLO* ARE DOING!

Three little rings of low-temperature EASY-FLO silver brazing alloy make this thermostatic expansion valve spacer, used in electric refrigeration equipment. Here's how they do it.

The shell is made of 18-8 stainless steel strip spot welded to hold it. Shell, and fittings which are brass stampings, are assembled with the 3 rings of 1/32" EASY-FLO wire preplaced, one at the top, one at the bottom and one around the spud. The assembly is liberally fluxed with low-temperature HANDY FLUX. It is then placed vertically in an induction heating coil which brazes one flange and ¾ of the shell seam. Assembly is then reversed and a second heating brazes the other flange the rest of the seam, the spud and a fitting on the inside. So the 3 little EASY-FLO rings make 5 joints in two fast heating operations—and produce a leak-tight assembly that has one-piece strength and the ductility to withstand any vibration, shock or temperature changes the metals themselves can take.

Thousands of parts are now being fabricated by EASY-FLO brazing, and more and more are being designed for it. The reasons—fast production, strong leak-tight assemblies, important savings in man-hours, machine-hours and metals. Good reasons why you should get the facts about EASY-FLO brazing. ***Bulletin 12-A*** will give them to you. Ask particularly about the new EASY-FLO 45.

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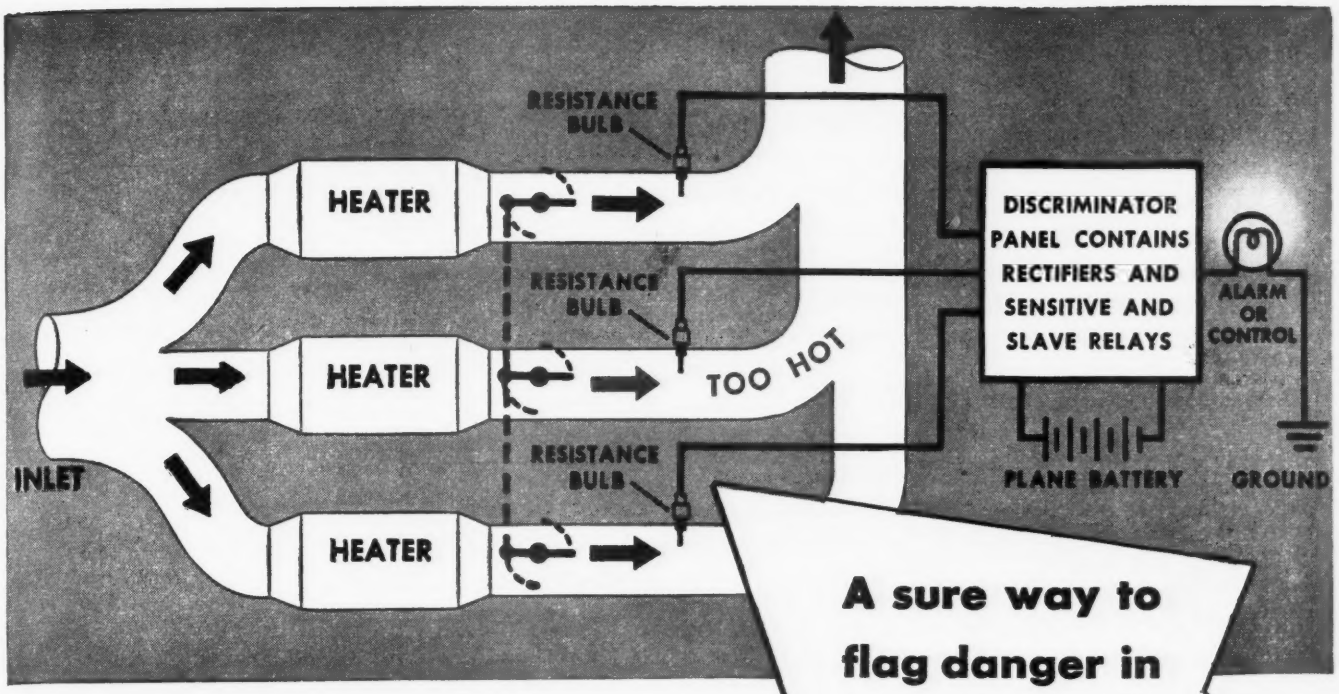
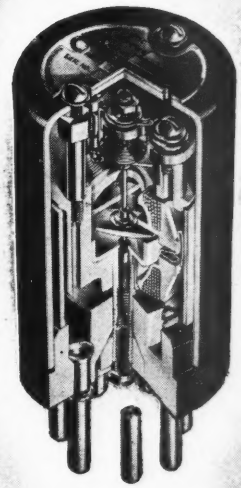


A sure way to flag danger in hot air ducts

The new EDISON critical temperature alarm for combustion heaters

← This is the Sensitive Resistance Bulb that signals when critical temperature is reached. It has no moving parts.

The resistance bulb is a conductor which responds sensitively to increase of absolute temperature by increasing its electrical resistance. When heat, hence resistance, reaches the critical point, a signal results.



And here is the Sensitive Relay that transmits signals from the bulbs to warning devices or controls. →

The Edison Sensitive Magnetic Relay uses an inverted D'Arsonval movement . . . the magnet moves instead of the coil. It is compact, sturdy, and operates on as little as 15 microwatts coil power in a discriminator circuit.

Extremely rapid sensing and alarm in case of excessive duct temperatures is now available in the new Edison Critical Temperature Alarm. This system offers the following desirable features for detecting critical heat in hot wing de-icing or space heater ducts:

1. The Edison Critical Temperature Alarm System operates in response to *absolute,* not relative temperatures.
2. It allows the use of more than one sensing element (sensitive resistance bulb) in the same circuit.
3. Its time constant is very low . . . response is practically instantaneous.
4. The sensing elements withstand high temperatures . . . are undamaged by continuous exposure to 600°F.
5. There are no moving parts in the hot air ducts.
6. Alarm is signaled when any one sensing element detects critical temperature.
7. Alarm temperature is pre-selected to ±50°F.
8. A test circuit is provided.

Edison engineers will be assigned to study your problems of duct temperature alarm or control as soon as you signify your interest.

Write for detailed information. Thomas A. Edison, Incorporated, Instrument Division, 5 Lakeside Avenue, West Orange, N. J.

EDISON

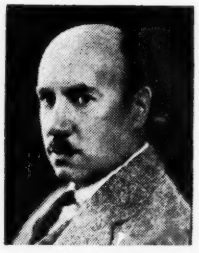
AIRCRAFT SYSTEMS AND INSTRUMENTATION

tions in 1947. Our faith in the long-term future of aviation is indicated by the fact that we are today investing more money than ever in the research and development necessary to maintain technological leadership.

Aviation People

Igor I. Sikorsky (photo), engineering mgr. of Sikorsky Aircraft, has been awarded Gold Medal of Federation Aeronautique Internationale for outstanding aeronautical achievement in 1946. Credited with having designed and built world's first multi-engined airplane, he is also recipient of Frank M. Hawks Memorial Trophy in recognition of his development of helicopter. He is an honorary member of IAS, and holds honorary degrees in numerous colleges and universities.

Lt. Gen. Barney McKinney Giles (photo) has been appointed head of engineering div. of Air Associates. During war, he served as commanding general of all AAF in Pacific area. In '45, he was knighted by King of England with Order of British Empire, and in '46 was presented with Special Cloud Banner Decoration of China, and Mexican Military Medal of Merit.



I. I. Sikorsky

Lt. Gen. Giles

Fred M. Glass (photo) has been named pres. of Air Cargo, Inc. Previously, he was v.-p., traffic, for PCA. During war, he served with ATC in England and India before becoming chief-of-staff of Pacific div. with rank of col. Prior to joining ATC, he served as counsel for AA.

F. M. Glass

A. L. Chabot

A. L. Chabot (photo) has been appointed supt. of maintenance for EAL. In his new post, he will supervise maintenance of airline's DC-4s and DC-3s. He has been with company 16 yr., and prior to that he was employed in experimental div. of Curtiss company. **H. H. Lloyd, Jr.**, has been named station mgr. for EAL at Hartford, Conn.

Otis F. Bryan (photo) has been made gen. mgr. of TWA's International div. He joined airline in '29 as co-pilot, and has been a v.-p. since '43. After outbreak of World War II, he was assigned to organize and direct Eagle Nest training school operated by line at Albuquerque, N. M.

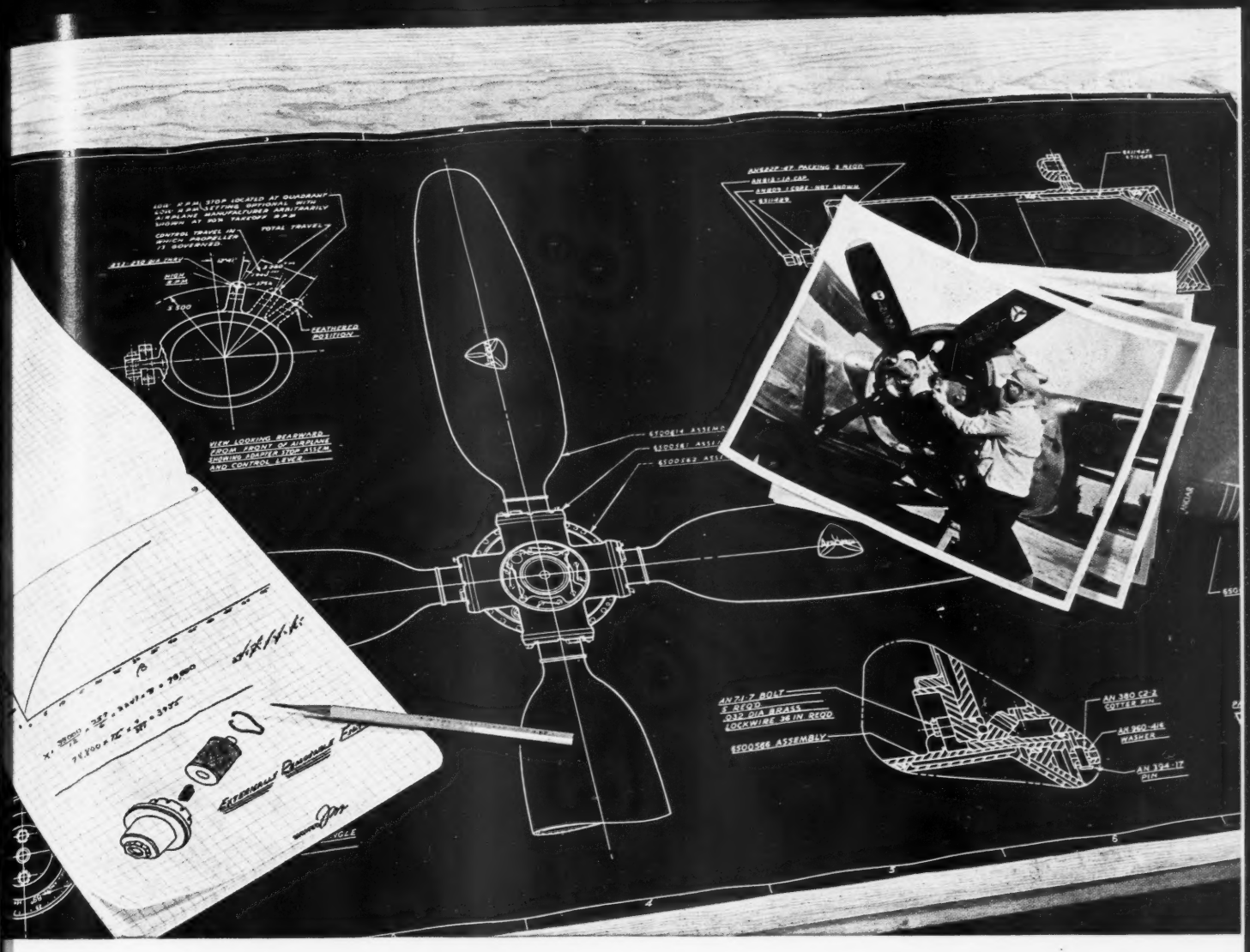
O. F. Bryan

J. P. Sullivan

John P. Sullivan (photo) has been promoted to post of personnel mgr. for Hamilton Standard Propellers div. of United Aircraft. He joined div. in '39 and in '43 served as personnel supervisor of plant at Rhode Island. Earlier, he was employed in Chance Vought div.

James G. Ray, v.-p. of Southwest Airways, has been made chairman of ATA's working committee on feeder airlines, with **Robert M. Love**, pres. of All-American, as vice-chairman. **J. Richard**

Many forging designs in steel, aluminum and magnesium have been originated by Wyman-Gordon. Typical of the many intricate forgings is this four-way spider . . . Every Wyman-Gordon forging is under strict, constant control by laboratories that through the years have contributed much to investigation and research of new forging techniques and of new alloys of steel and the non-ferrous light metals.
Standard of the Industry for Sixty Years
WYMAN-GORDON
Forgings of Aluminum, Magnesium, Steel
WORCESTER, MASSACHUSETTS, U. S. A.
HARVEY, ILLINOIS - DETROIT, MICHIGAN



More Air Hours—by Design

BECAUSE of its *self-contained unit construction,* the Aeroprop requires a minimum of maintenance time. As a consequence, this propeller contributes to maximum utilization of the airplane whether in commercial or military service.

In the air, two other basic characteristics contribute to the Aeroprop's performance record. *Simplicity* delivers dependable long life. *Lightness,* based on the weight-saving of its strong, ribbed-steel hollow blades, increases payloads.

These basic Aeroprop principles can be designed into a propeller to meet your performance requirements. We are doing it for many manufacturers today.

Production and performance of these airplanes will benefit from this advance engineering. Let Aeroproducts—backed by General Motors research and manufacturing facilities—work with you *today* to meet tomorrow's *propeller* needs.

THIS IS THE AEROPROP—an instant-feathering propeller available with reverse pitch, electric de-icing, and all other features required for any installation. Regulator, hub, and blade assemblies are designed for unit installation or replacement. It is strong, light and simple.

AEROPROP GM GENERAL MOTORS

Aeroprop

BUILDING PROPELLERS FOR AIRCRAFT TODAY
DESIGNING PROPELLERS TO MEET TOMORROW'S NEEDS

AEROPRODUCTS DIVISION • GENERAL MOTORS CORPORATION • DAYTON, OHIO

These Nickel alloy steels, used in NAvion components listed below, may offer advantages to you.

ENGINE PARTS—A six-cylinder, air-cooled Continental engine powers the NAvion plane manufactured by North American Aviation, Inc. Adhering to standard practice in aircraft engine design, heat-treated Nickel alloy steels are used for the more highly stressed working parts . . . to assure maximum flying safety and long, trouble-free operation.

EXHAUST STACK—Type 347 stainless chromium-Nickel steels stabilized with columbium are used to combat both corrosion and high temperature effects.

CANOPY TRACK AND ADJUSTABLE SEAT TRACK—To resist atmospheric corrosion and insure smooth-sliding operation, these tracks are made of Type 302 (18-8) chromium-Nickel stainless steel.

FIREWALL—For maximum protection to pilot and passengers, the firewall between engine and fuselage is made of Type 302 (18-8) corrosion resistant stainless steel.

LANDING GEAR—Here, three basic reasons led North American to specify "8630" Nickel Chromium-molybdenum steel tubing—uniform strength, toughness after suitable heat treating, and ready fabrication by welding.

For safety and dependability, use Nickel alloy steels.

INCO Nickel
TRADE MARK

Over the years, International Nickel has accumulated a fund of useful information on the selection, fabrication, treatment and performance of alloys containing Nickel. This information and data are yours for the asking. Write for "List A" of available publications.

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N. Y.

Scott has joined Southwest Airways as mgr. of its tariff and rates div. **Paul D. Niles** has been named chief traffic exec. for Braniff.

Paul J. Kaniut (photo) has been appointed chief pilot and supervisor of aircraft and landing field operations for Ford Motor Co. Previously, he was associated with Bendix Aviation as a pilot-engineer, and he is a former capt. of UAL, PCA, and CAL. As an engineering pilot for NWA, he compiled and

P. J. Kaniut

R. M. McCraith

wrote a flight procedure manual which was later adopted as standard by Army and Navy and various airlines. He is a member of Caterpillar Club.

Robert M. McCraith (photo) has been appointed mgr. of labor relations dept. for NAL. Previously director of personnel relations for ATA, he has been in labor relations field for 15 yr. During war, he served as an officer in Navy. **Merwyn O. Wesner** has been made supervisor of aircraft radio for NAL.

Gael Sullivan has resigned as Acting Second Assistant Postmaster General, and he has become exec. director of National Democratic Committee. **John J. Gillen,** who has been serving as Deputy Second Assistant Postmaster General, has succeeded him.

D. A. Medland has been appointed to coordinating staff of v.-p., administration, for UAL.

PAA appointments: **Howard B. Dean** has been made administrative v.-p.; **Quentin Roosevelt** has been appointed asst. to v.-p. and **Dewitt Greer** has been named communications supt. of Latin American div.

Elmer R. Bayless has been appointed mgr. of new parts dept. of C.-W.

Harold Markell has been named v.-p. and gen. mgr. for U. S. Airlines.

Robert M. Carpenter is now gen. mgr. of manufacturing div. of All American Aviation.

Bert W. Holloway has been named sales development mgr. in charge of adv., publicity, sales promotion, and market research for Lockheed.

William R. Ryan has been appointed chief engineer for Edo Aircraft.

Paul F. Scheiderer has been appointed personnel mgr. for Goodyear Aircraft.

Frederic G. Muller has resigned as dir. of pub. rel. for Bendix Aviation.

CAA promotions: **E. M. Sturhahn** has been named asst. administrator for business management; **Frederick Lee** has been appointed exec. asst. to administrator; and **H. Lloyd Child** has been made asst. to administrator for personal flying development.

David J. McFarland is now branch mgr. of N. Y. div. of American Air Export-Import Co.

Maulsby Forrest has been elected a v.-p. of AA, and **R. B. Wagoner** has been appointed supt. of maintenance for company's contract air cargo div.

W. W. Anderson, R. H. Daisley, F. C. Greenhill, K. J. Ammerman, and **C. C. Carlton** have been elected directors of Automotive & Aviation Parts Manufacturers, Inc.

Vernon G. Crudge, head of Atlantic div. of BOAC, has been elected chairman of North Atlantic Traffic Conference of IATA.

Hayes Dever has been named acting director of traffic and sales for PCA, and **Emily Youmans** has been appointed mgr. of passenger relations.

Don R. Berlin has been named gen. v.-p. in charge of contracts and engineering for McDonnell Aircraft.

Guy A. Ham, Jr., pres. of Cape Airways, has been elected pres. and chairman of board of N. Y. Aviation Trades Assn., with **John J. Drescher,** Beacon Flying Service, as v.-p., and **H. Liebee Wheeler,** Buffalo Aero. Corp., as sec'y-treas.

Gerard E. Quintero, Jr., has been appointed N. Y. gen. mgr. of Linea Aeropostal Venezolana.

Lester Eisner, Jr., has been elected pres. of Latin American Airways.

James P. Farrell has been named dist. traffic mgr., of NWA at N. Y. C.

PATENT
LISTINGS

Following are selected listings of some of the more interesting patents on aviation developments granted through the U. S. Patent Office. Printed copies of any of these patents are obtainable directly from U. S. Patent Office, Washington, D. C., at a cost of 25¢ each.

Propeller Jettisoning Mechanism, 2,413,373, filed Mar. 22, '43, pat. Dec. 31, '46, W. J. Peterson, assignor to Curtiss-Wright Corp.

Instrument Illuminating Device, 2,413,381, filed Oct. 22, '43, pat. Dec. 31, '46, G. V. Rylsky, assignor to Bendix Aviation Corp.

Automatic Charger for Machine Gun, 2,413,416, filed Sept. 3, '40, pat. Dec. 31, '46, A. I. Ostlund and J. C. Christian, Jr., assignors to Boeing Aircraft Co.

Pitch Control Mechanism, 2,413,439, filed Sept. 15, '41, pat. Dec. 31, '46, G. F. Drake, assignor to Woodward Governor Co.

Turnbuckle Fairing and Lock, 2,412,566, filed June 20, '42, pat. Dec. 17, '46, G. W. De Bell and T. C. Hill, assignors to The Glenn L. Martin Co.

Airplane Wheel Turning Device, 2,412,884, filed Dec. 28, '45, pat. Dec. 17, '46, P. J. Grabash.

Variable Pitch Propeller, 2,412,923, filed Sept. 6, '40, pat. Dec. 17, '46, R. Steven-

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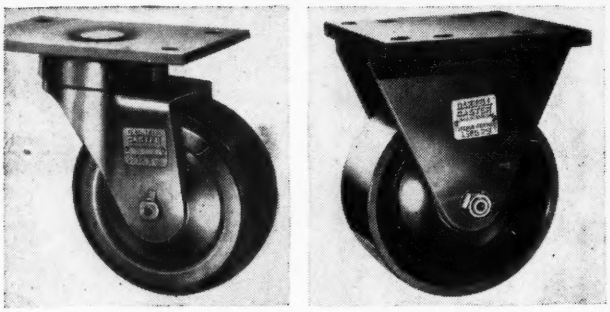

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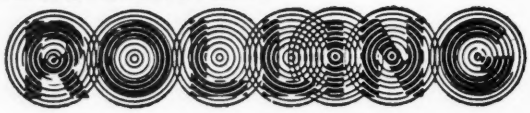

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son, assignor to Stevenson Engineering Corp.

Airplane Design, 2,413,460, filed May 16, '44, pat. Dec. 31, '46, D. W. Main.

Helicopter Control, 2,413,625, filed June 23, '43, pat. Dec. 31, '46, R. R. Hays.

Automatic Gun Charger, 2,413,112, filed Dec. 26, '40, pat. Dec. 24, '46, G. W. Pontius, III, and A. P. Wilson, assignors to Bendix Aviation Corp.

Gun Turret, 2,413,114, filed Jan. 18, '43, pat. Dec. 24, '46, G. W. Pontius, III, and F. V. Kuzmitz, assignors to Bendix Aviation Corp.

Carburetor, 2,412,563, filed July 20, '44, pat. Dec. 17, '46, R. D. Curk, assignor to Chandler-Evans Corp.

Recent Books

Thumbnail reviews of selected aviation books and pertinent business and industrial texts.

AIR MARKET VALUES, by George Stromme & Associates, Los Angeles, Cal. 132 pages. Annual fee, including quarterly revisions, $15.00.

This new issue gives current wholesale, retail, and loan values, as well as the original list prices, of more than 1,400 distinct aircraft models. All facts necessary to understand the evaluations of the aircraft are tabulated for each model of civilian manufacture in the U. S. since 1930. Another section gives value ratings of all military planes offered for public sale as surplus. This work is seen as a decided asset to the libraries of finance and insurance organizations as well as aircraft dealers, repairmen, and manufacturers.

EXAMINATION OF INDUSTRIAL MEASUREMENTS, by John W. Dudley, Jr. McGraw-Hill Book Co., New York City. 113 pages. $2.00.

With special emphasis on broad industrial application, this book provides simple means for constructing control charts, making quartile analysis, and analyzing the limitations of curves made from industrial or engineering data. Examples are given to demonstrate the examination of various types of industrial measurements and to illustrate how reliable data can be distinguished from erratic data.

THE SOCIAL EFFECTS OF AVIATION, by William Fielding Ogburn. Houghton Mifflin Co., Boston, Mass. 755 pages. Illustrated.

This book offers prognostication of the changes that are coming because of aviation. How aircraft transportation is affecting civilization, as reported in this book, reveals processes which are quite general; hence other discoveries, like the use of atomic energy, will conceivably follow similar paths. Because of the interrelated nature of our culture, a wide range of social institutions are covered. A conspicuous omission is consideration of the effect of aviation on any future warfare.

MAGNESIUM FABRICATION, by Lothair B. Harkins. Pitman Publishing Co., New York City. 149 pages. Illustrated. $2.75.

Dealing primarily with the fabrication of wrought magnesium materials, such as sheet, extrusions, and tubing—commonly known as sheetmetal work—this book details the specific techniques required in working the metal. The experienced sheetmetal worker in aircraft fabrication will have initial advantage in learning something about magnesium fabrication. Data and instructions to aid the worker in becoming expert are included.

AIR TRANSPORT AT WAR, by Reginald M. Cleveland, Harper & Bros., New York City. 324 pages. Illustrated. $3.50.

Based on original records and illustrated with official photographs, this book brings together for the first time an integrated record of the almost miraculous achievements and logistics of the air transport arms of the military service. It reveals how indispensable to our military success were the civilian air transport lines—the seed

from which grew ATC and NATS. Foreword is by Lt. Gen. Harold L. George, wartime commander of the Air Transport Command.

MATRIX AND TENSOR CALCULUS, by Aristotle D. Michal, Galcit Aeronautical Series, John Wiley & Sons, Inc., New York City. 132 pages. $3.00.

Based on a series of lectures sponsored by the U. S. Government engineering, science, and management war training program, this book treats much new material heretofore not included in a single volume. Aeronautical applications include chapters on the mathematical theory of aircraft flutter and applications of tensor calculus to boundry-layer theory.

THE AERONAUTICAL DICTIONARY, by Thomas A. Dickinson, Pitman Publishing Co., New York City. 484 pages. Illustrated. $3.50.

Over 6,000 aeronautical and related terms are defined here, and where required, drawings and photos (more than 300) are used to clarify the meanings. Included is a comprehensive bibliography, also an appendix of useful charts, tables, and other working data.

INDUSTRIAL PUBLICATIONS

A new quick reference publication, designed to aid export airfreight shippers, provides a handy chart on documents required by various nations. Titled "International Shipping Documents," it is available from the Cargo Sales Div., American Airlines, New York City . . . "Report on Steel Metallurgy at Messerschmitt," also reports on standards for steel and aluminum alloys used in German aircraft, are now available through the Office of Technical Services, Dept. of Commerce, Wash., D. C. Photostatic copies are priced at $43; microfilm at $6.50. Checks are to be made payable to Treasurer of U. S. . . . "Soil Tests for Military Construction" is a technical bulletin issued by the Airport Div. of the American Road Builder's Assn. This publication and the companion booklets, "Steps an Airport Sponsor Must Take to Participate in the Federal-Aid Airport Program" and "The Use of Heavy Equipment for Obtaining Maximum Compaction of Soils," are available without charge from the Association, 1319 F Street, NW Wash., D. C.

Cornell has just issued a new Graduate School of Aeronautical Engineering brochure outlining objectives and activities; numerous illustrations are included . . . "Standard Operating Procedure" is the title of an informative booklet prepared by Socony-Vacuum Oil Co. for distribution among operators and dealers at airports where the company's aviation products are for sale . . . "War Wings For Peace" is a presentation by the War Assets Administration illustrating the many types of surplus military aircraft which may be converted to peacetime uses.

"Aviation Education Material" comprises literature prepared by the Massachusetts Aeronautics Commission primarily to assist teachers in acquainting students with the many ramifications of the air age . . . "The Airport Terminal Building" and "Airport Planning and Consulting Service" are two booklets put out by Giffels & Vallet, Inc., of Detroit. They deal with working practice of airport planning and development . . . "Behind an Air Victory' is a case history of Boeing's contribution to U. S. air might . . . "Aerolog," a directory of airplane, engine, and propeller parts, is designed to enable private plane owners to secure any needed part within a matter of hours, instead of days or weeks. This directory has been issued by The Steck Co., Austin 1, Tex.

★ COMING UP ★

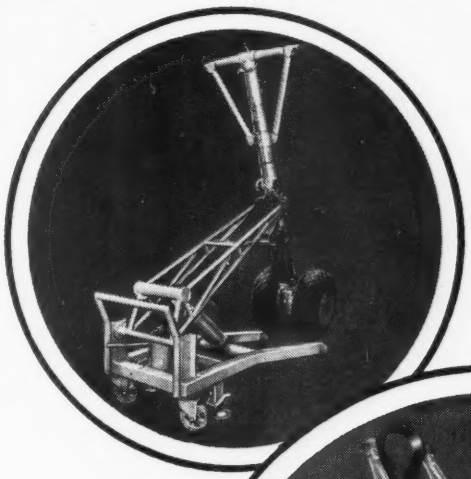
March 1–2: Southeastern States Soaring Contest, Sanford, Fla.

March 8–9: Festival of States Air Show, sponsored by Festival of States Comm., St. Petersburg, Fla.

March 15–16: All-Woman Air Show, sponsored by Florida Chapter of Ninety-Nines, Tampa.

March 17–19: Airlines Engineering

(*Continued on page* 140)



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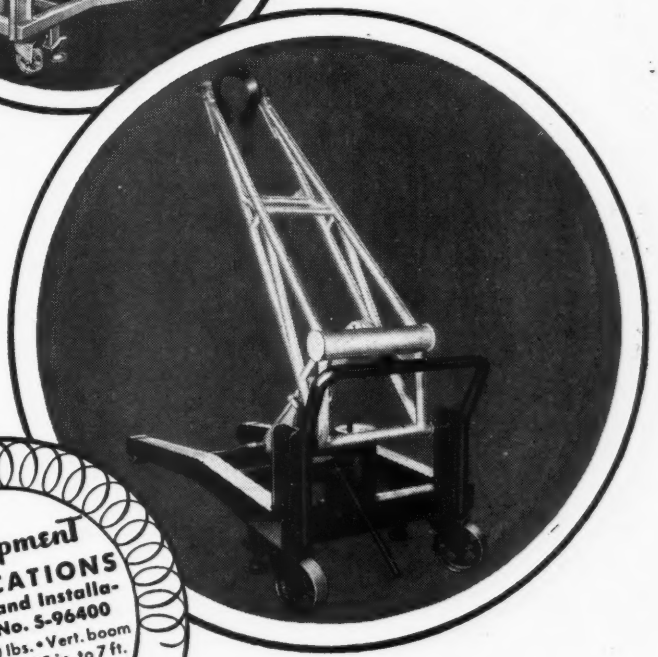

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Gear Hoist and Installation Jack No. S-96400
Lift cap.—2400 lbs. • Vert. boom movement—from 25 in. to 7 ft.
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Base 33½ in. x 7½ ft.
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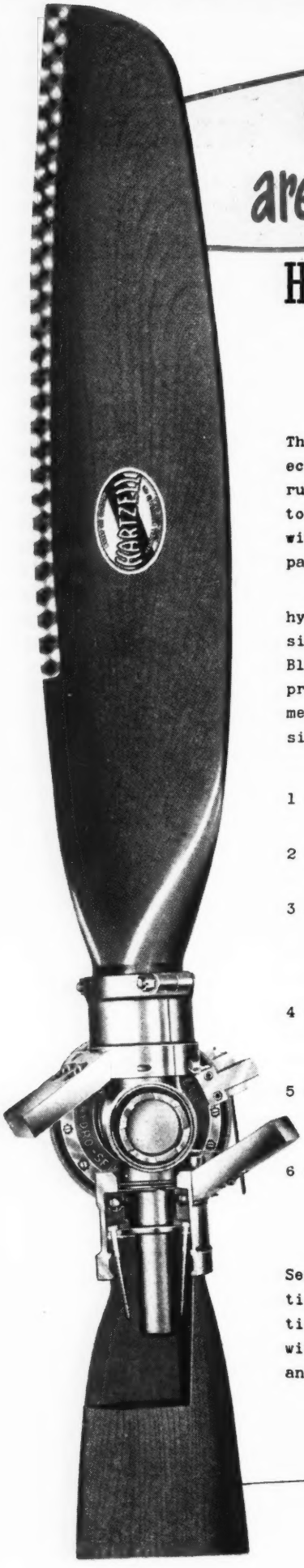

Hartzell Hydro-Selective Props are built for performance—and endurance

HARTZELL PROPELLER COMPANY

Manufacturers of Airplane Propellers

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The Hartzell Hydro-Selective Propeller gives you extra speed and economical cruising; it increases ceiling height; it shortens take-off run. It gives your plane new versatility, new safety. It allows you to select the performance you want, as you fly. It responds instantly, with precision, at the touch of a push-pull button on the instrument panel which gives you pitch adjustment to within 10 RPM!

And it is built for endurance - long life. Its non-revolving hydraulic mechanism, actuated by oil pressure, is operated by a simple, supersensitive valve which the push-pull button controls. Blades automatically go into high pitch in the event of loss of oil pressure. On reversible models, pitch can be completely reversed by means of a separate, fool-proof lever. The entire mechanism is simple, precision-built, long-lived.

Hydro-Selective propeller blades are built of Hartzite plastic.

1 - Hartzite blades are MOISTURE PROOF . . . will not shrink, swell, warp or twist under the most adverse weather conditions.

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3 - Hartzite blades are SOLID MATERIAL THROUGHOUT . . . Hartzite is not a covering material but a basic high-strength, reinforced plastic. Scratches, abrasion and other surface damage do not cause deterioration.

4 - Hartzite blades are LIGHT, STRONG, DURABLE . . . half as heavy as aluminum alloy, Hartzite blades are made equally thin. Will stand proportionately as much centrifugal loading as aluminum.

5 - Hartzite gives STRONG BLADE RETENTION . . . blades are primarily gripped in the hub by a double shoulder of Hartzite, which is reinforced with steel.

6 - Hartzite blades are SMOOTHER AND QUIETER . . . because of the excellent vibration-damping qualities of Hartzite, operation of the propeller is noticeably quieter and smoother than the ordinary propeller.

Send for folder giving descriptions of Hartzell Hydro-Selective, Ground Adjustable (also with Hartzite plastic blades) and Fixed Pitch propellers.

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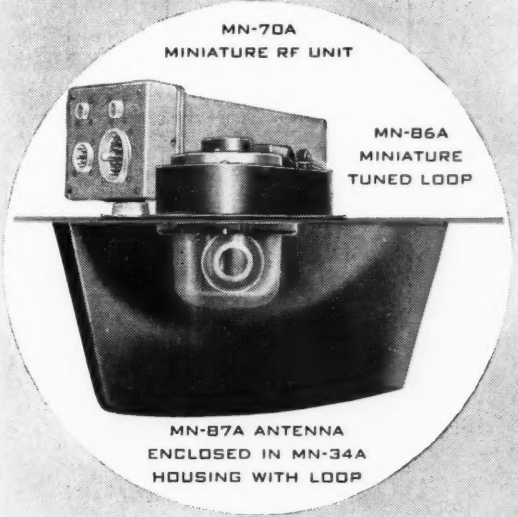
*Complete single ADF installation 42½ pounds

Newest product of Bendix Flight Engineering—the NA-2 ADF System—developed by the same engineers who designed the world-famous MN-31 and NA-1 ADF Systems—meets aviation's increasing need for improved long-range performance, reduced air drag and weight with increased flexibility of installation. Elimination of loop and antenna transmission lines and use of a complete, miniature RF tuning unit adjacent to the miniature, tuned loop and sense antenna results in greatly improved sensitivity over other ADF systems.

The NA-2 System is particularly well-adapted to large aircraft installations due to circuit arrangements permitting grouping of the loop, sense antenna and miniature RF unit 100 feet or farther from the MN-75A IF-AF unit, which contains the i.f., audio, power and automatic loop control circuits. Remote control may be located at any desired distance from associated equipment. The Bendix electrical tuning system provides smooth, finger-tip control without the undesirable "back lash" characteristic of mechanical remote tuning systems nor the "overshooting" of earlier electrical tuning systems employing "left-right" switches or rheostats. Hermetic sealing of the loop and other components assures long life and trouble-free operation with a minimum of maintenance.



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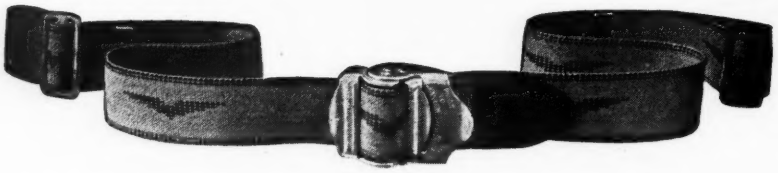

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5. **Fool-proof, plastic tip** . . . nothing to pull off, nothing to fray.
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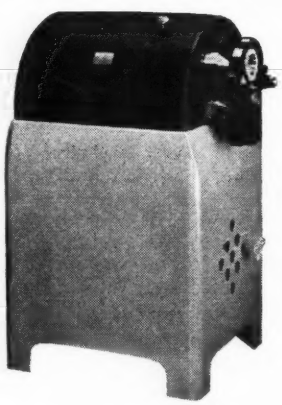

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& Maintenance Conference, St. Louis, Mo.

March 19–20: Regional Aviation Clinic, sponsored by CAA and State Aeronautics Commissions, Congress Hotel, Chicago.

March 27–29: Third Annual Philadelphia Forum of American Helicopter Society, Phila.

March 28: IAS Aircraft Propulsion Meeting, Cleveland.

Apr. 9–11: SAE Aeronautics Meeting, Hotel New Yorker, New York City.

Apr. 18–27: Michigan Aviation Week, sponsored by Aero Club of Mich., Detroit.

May 5–10: International Travel Exposition, Grand Central Palace, New York City.

May 6: PICAO Assembly Meeting, Montreal.

May 9–17: Air Fair, sponsored by Aviation Council of Metropolitan St. Louis.

May 11–15: American Airport Exposition & Exhibit, in conjunction with Annual Convention of American Assn. of Airport Executives, Sherman Hotel, Chicago.

May 26–27: IAS Light Aircraft Meeting, Detroit.

May '47: PICAO South American Regional Air Navigation Meeting (Lima).

May '47: PICAO South Atlantic Regional Air Navigation Meeting (Rio de Janeiro).

June 1–5: Aviation Writers Assn. Annual Convention, Los Angeles.

Sept. '47: PICAO Southeast Asia Regional Air Navigation Meeting (India).

Sept. 2: National Air Races for lightplanes, sponsored by Goodyear. Cleveland.

Nov. 4–7: National Airport Show & Institute, Municipal Auditorium, sponsored by Air Foundation and National Aeronautics Assn., Cleveland.

New Construction

Here is a new regular AVIATION feature keyed to new construction in the aeronautical industry, giving in concise form a collation of new projects in all phases of the business.

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Manhattan, Kan. — AIRPORT — City, developing landing area and public facilities. $177,605. CAA.

Neodesha, Kan.—AIRPORT BLDG., etc.—City, administration bldg., developing landing area and public facilities. $187,700. CAA.

Salina, Kan.—AIRPORT—City, developing

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- Excluding dirt, grit, dust, etc.
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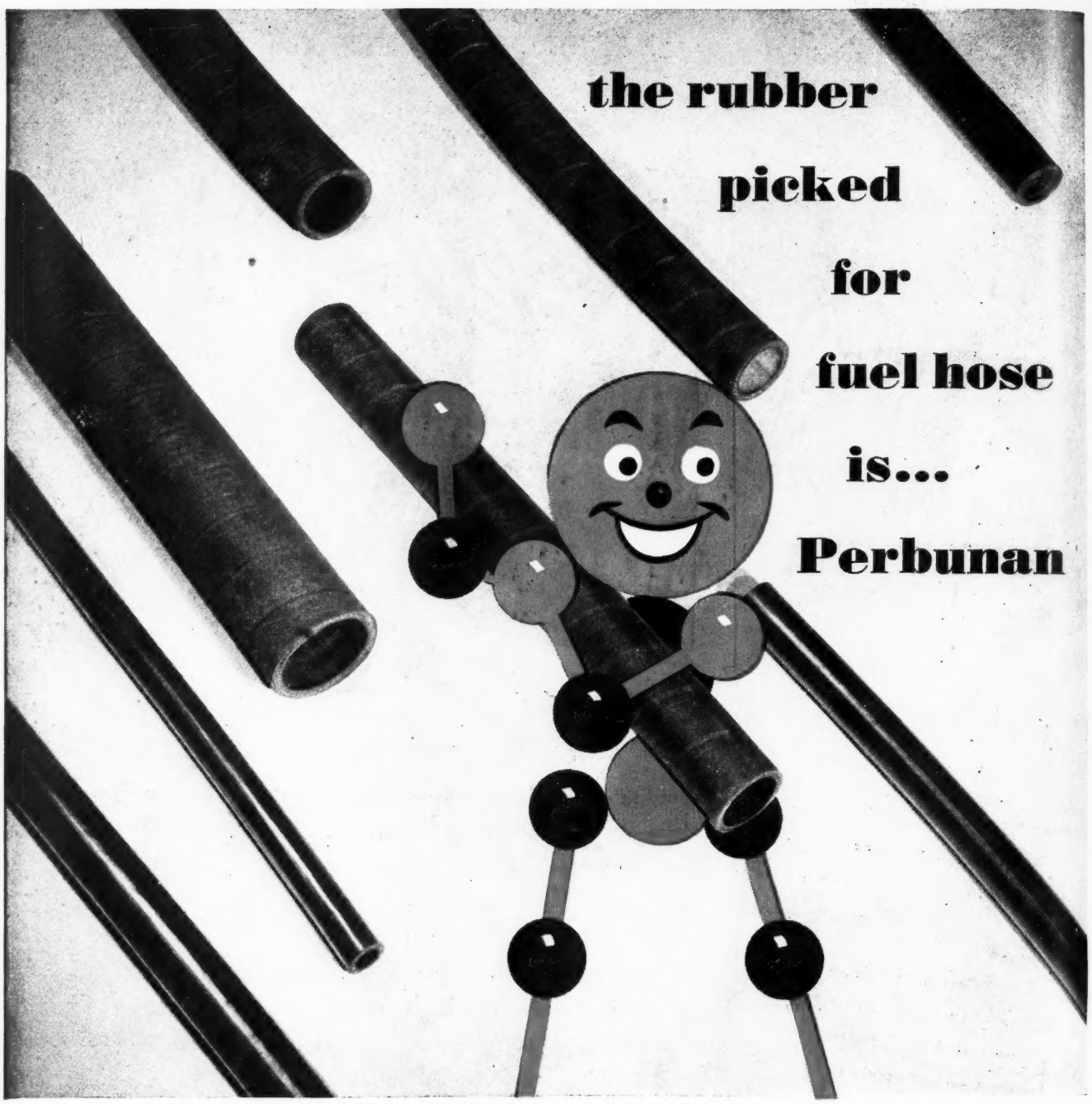

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Delivering fuel oil and diesel oil...dispensing gasoline from truck and tank...meeting hose specifications of many Army and Navy needs—are but a few instances where Perbunan plays an important helping role in the high performance demanded of National Synthetic Hose.

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Resists damage from water, oil, excessive heat, abrasions and petroleum hydrocarbons . . . retains flexibility at sub-zero temperatures!

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landing area and public facilities. $387,000. CAA.

Paducah, Ky.—AIRPORT—City, grading, drainage, paving, lighting bldgs., utilities, approach clearance. $180,000. CAA.

Pikeville, Ky.—AIRPORT—City, grading, drainage, paving, lighting bldgs., utilities, approach clearance. $318,546. CAA.

Attleboro, Mass. — AIRPORT — Airport Comn., Attleboro, municipal airport, incl. landing strips, 2 paved runways, etc., Proj. 1-19-P-211. $490,000. Fay, Spofford & Thorndike, 11 Beach St., Boston, Zone 8, consult. engrs.

Brockton, Mass.—AIRPORT—City, clearing, grading, draining one landing strip 3,500x500 ft. with surface treated runway 3,000x150 ft. and also clearing approaches. $153,702. CAA.

Pittsfield, Mass.—AIRPORT—City, landing, clearing, grading, draining one 3,700x225 ft. landing strip with 3,500x150 ft. paved runway. $171,800. CAA.

Taunton, Mass.—AIRPORT — City, exten. N/S landing strip to 2,700x300 ft. with surface treated runway 3,500x150 ft.; exten. NW/SE landing strip to 2,000x300 ft., King Field. $148,069. CAA.

Ann Arbor, Mich.—AIRPORT—City, grading, drainage, paving, lighting, bldgs., utilities. $179,500. CAA.

Bay City, Mich.—AIRPORT—City, grading drainage, paving, etc., Bay City-James Clements Airport. $165,500. CAA.

Grand Marais, Mich. — AIRPORT — City, grading, drainage, lighting, utilities. $233,000. CAA.

Houghton and Hancock, Mich.—AIRPORT—Cities, grading, drainage, paving, bldgs., utilities, approach clearance, and lighting, Houghton Co. Airport. $601,960. CAA.

Sault Ste. Marie, Mich.—AIRPORT—City, grading, drainage, paving, lighting. $150,000. CAA.

Brainerd, Minn.—AIRPORT—City, grading, drainage, paving and approach clearance, Brainerd-Crow Wing Co. Airport. $157,500. CAA.

Mankato, Minn.—AIRPORT—City, grading, drainage, lighting and approach clearance. $149,600. CAA.

Clayton, N. M.—AIRPORT—City, 3 strips, runway, taxiway, apron, fencing, marking, road, parking area. $158,255. CAA.

Gallup N. M.—AIRPORT—City, 1 runway, taxiway, apron, fencing, marking road, parking area. $346,530. CAA.

Binghamton, N. Y. — AIRPORT — City, clearing, grading, draining 3 landing strips and bldg. area, Broome County Airport. $2,445,000. CAA.

Saranac Lake, N. Y.—AIRPORT—City, paving E. W. runway, taxiways and apron, seal existing runways, admin. bldg., lighting and access road. $250,000. CAA.

Utica and Rome, N. Y.—AIRPORT—Cities, clearing, grading, drainage 2 landing strips, paving two runways, apron and taxiways, lights, admin. bldg. and access roads, Oneida County Airport. $1,300,000. CAA.

Fayetteville, N. C. — AIRPORT — City, clearing, grubbing, grading, drain and turf land area. $210,634. CAA.

Greensboro, N. C.—AIRPORT—City, constructing three 500x4,200 landing strips, entrance road and apron, taxiways, enlarging apron, administration bldg., Greensboro-High Point Airport. $224,800. CAA.

Hickory, N. C.—AIRPORT—City, constructing N/S runway, 150x4,000 ft., exten. NE/SW runway, by 400 to 4,370 ft. installing ANC lighting constructing access road and apron. $460,000. CAA.

Morganton and Lenoir, N. C.—AIRPORT—Cities, impr. airport, 3 landing strips, Morganton-Lenoir Airport. $300,000. CAA.

Shelby, N. C.—AIRPORT—City, clearing, grubbing, grading, draining turf land area, constructing 3 landing strips. $386,000. CAA.

Statesville, N. C.—AIRPORT—City, clearing, grubbing, draining turf landing area, constr. administration bldg. and apron, 2 landing strips. $144,600. CAA.

Williston, N. D.—AIRPORT—City, grading, paving, lighting, buildings and utilities. $148,900. CAA.

Lawton, Okla.—AIRPORT—City, clearing, grubbing, grading, drainage, seed or sod, fencing landing area, pave 1 runway, apron and taxiway. $214,750. CAA.

Allentown and Bethlehem, Pa.—AIRPORT—Cities, taxiways, parking apron, field lighting, auto parking area and appurtenant work, Allentown-Bethlehem Airport. $202,600. CAA.

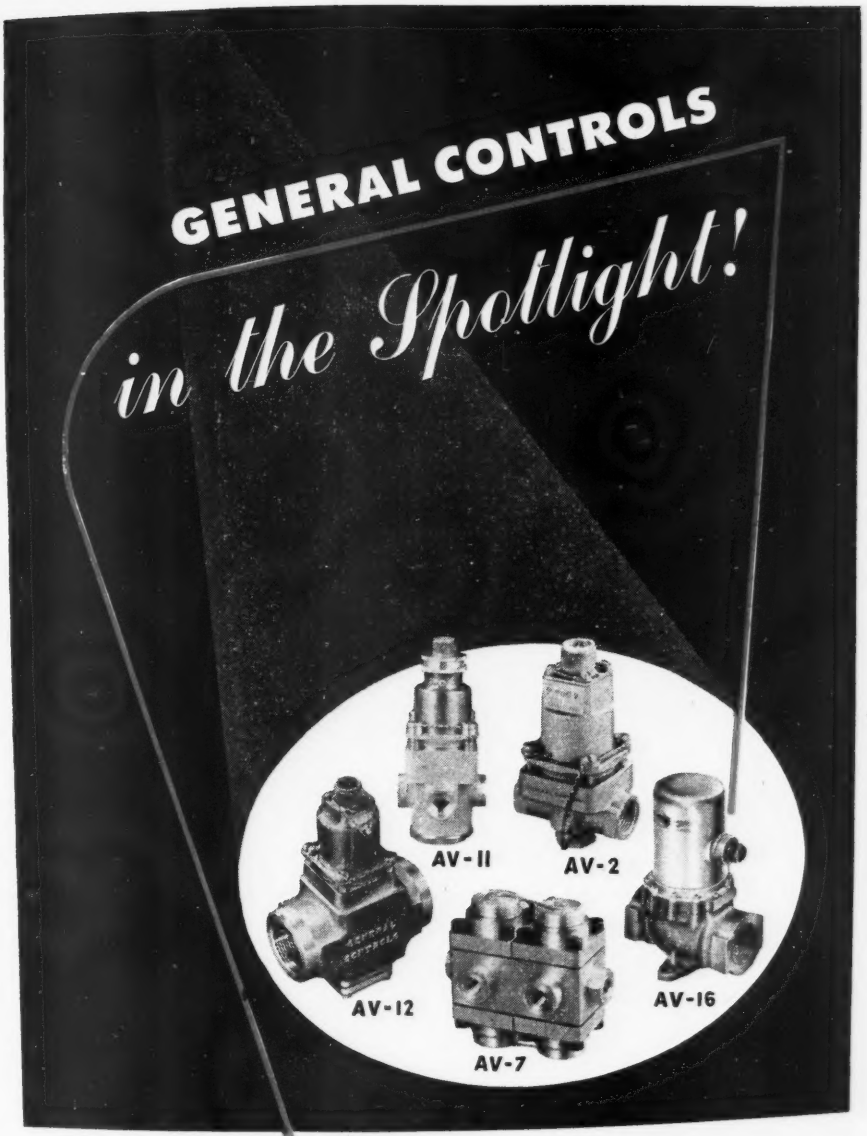
Beaver Falls, Pa.—AIRPORT—City, 1st. stage constr. to provide one 300x2,150 ft. and one 500x2,150 ft. landing strips Beaver County Airport. $195,676. CAA.

Bradford, Pa.—AIRPORT—City, grade and imprv. bldg. area, constr. 1st stage paved apron and taxiway, access road and utilities, Bradford-McKean County Airport. $180,000. CAA.

Chambersburg, Pa.—AIRPORT—City, grading, draining landing strips, (eliminating admin. bldg. from request). $156,000. CAA.

Franklin, Pa.—AIRPORT—City, constructing 2 landing strips, Lamberton Memorial Airport. $162,000. CAA.

Harrisburg, Pa.—AIRPORT—Dpt. Property & Supplies, Capitol Bldg., plans 80% com-



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Compact Size • Light Weight • Tight Shut-off *High Flows with Low Pressure Drop • Long Life.*

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AIRCRAFT TUBING

(5/8" OD and under)

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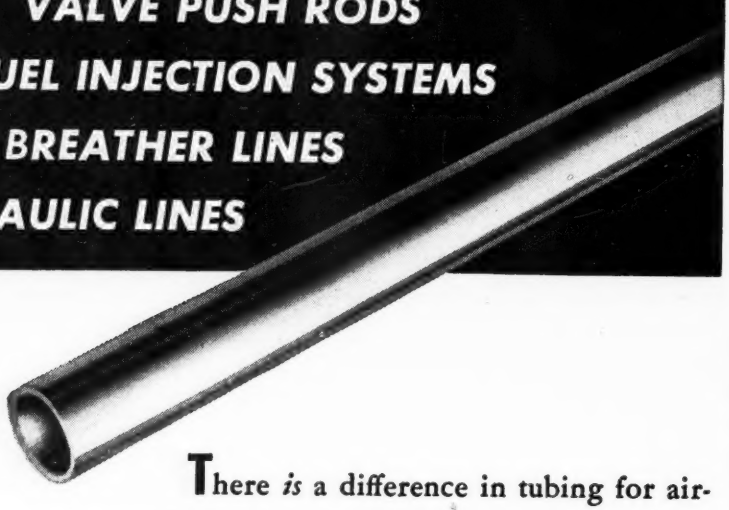
VALVE PUSH RODS
FUEL INJECTION SYSTEMS
OIL BREATHER LINES
HYDRAULIC LINES



There *is* a difference in tubing for aircraft—and that difference begins with the QUALITY CONTROL that starts right in with Superior's Laboratory—and goes through production and inspection in our plant.

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SUPERIOR TUBE COMPANY
Norristown, Pennsylvania

pleted, imprv. Harrisburg State Airport, 5 mi. south of here near New Cumberland in York Co., addnl. landing facilities, administration bldg. addns. $600,000. Michael Baker, Jr., Rochester, consult. engr. David Johnson Pa. Aeronautics Comn. Harrisburg State Airport, New Cumberland, airport engr. CAA.

Hazelton, Pa.—AIRPORT—City, grading, draining work on 2 landing strips. $151,000. CAA.

Huntington, Pa.—AIRPORT—City, grading, draining landing strip, relocating creek. $146,000. CAA.

Indiana, Pa.—AIRPORT—City, clearing, grading, draining landing strips. $156,000. CAA.

Johnstown, Pa.—AIRPORT—City, general imprvs., apron paving, lighting, etc. $240,500. CAA.

Lancaster Pa.—AIRPORT—City, regrading entire site and installing basic drainage. $350,000. CAA.

New Kensington, Pa.—AIRPORT—City, grading, drainage, Merwin Airport. $170,000. CAA.

Phila., Pa.—AIRPORT—City, Southwest Airport, Phila., administration bldg., paving runways, constructing taxi strips. $1,956,000.

Williamsport, Pa.—AIRPORT BLDG., etc.—City, admin. bldg., paving taxiway and apron. $194,000. CAA.

Newport News, R. I.—AIRPORT—City, clearing, grading, draining, landing strip 500x3700 ft., surface treating runway, 150x3,500 ft., Newport State Airport. $167,000. CAA.

Brookings, S. D.—AIRPORT—City, administration bldg., landing area, public facilities, $358,492. CAA.

Huron S. D.—AIRPORT BLDG. etc.—City administration bldg. landing area, public facilities. $338,500. CAA.

Yankton, S. D.—AIRPORT—City, landing area, public facilities. $170,368. CAA.

Borger, Tex.—AIRPORT—City, Grade 2 Class 2 landing strips, one Class 1 landing strip, bldg. and parking area, paving runways, taxiways and apron, build access road, Hutchinson Co. Airport. $389,612. CAA.

Jasper and Kirbyville, Tex.—AIRPORT—Cities, constr. two Class 1 landing strips, apron, lighting and admin. bldg., miscellaneous incidental facilities, Jasper County Airport. $164,000. CAA.

Odessa, Tex.—AIRPORT—City, complete 4 Class 11 landing strips, pave and light one Class 11 runway and taxiways, pave apron, imprv. access road, Ector County Airport. $225,400. CAA.

Price, Utah—AIRPORT—City, grading, runway and taxiway paving, lighting, Carbon Co. Airport. $181120. CAA.

Vernal, Utah—AIRPORT—City, grading, runway paving, and lighting project. $192,040. CAA.

Charlottesville, Va.—AIRPORT—City, grading two 4,200 ft. strips or developing existing field by grading, runway and exten. existing N/S runway. $170,000. CAA.

Harrisonburg, Va.—AIRPORT—City, grading, two 500x3,000 ft. strips, administration bldg. incidental drainage, seeding, etc. Tri-City Airport. $220,000. CAA.

Martinsville, Va.—AIRPORT—City, grading, 3,000 ft. strip and administration bldg. $170,000. CAA.

Newport News, Va.—AIRPORT—City, grading 2 strips 3,000 ft. x 500 ft., constructing administration bldg., incl. incidental grading, landscaping, etc., Patrick Henry Airport. $280,000. CAA.

Port Townsend, Wash.—AIRPORT—City, clearing, grubbing, grading, draining, fencing, marking, paving and administration bldg., County-City Airport. $156,100. CAA.

Beckley, W. Va.—AIRPORT—City, 2 landing strips, 500x3,000 ft., paving 100x3,000 ft., constructing plane and auto parking area and access road, administration bldg., Raleigh County Memorial Airport. $583,710. CAA.

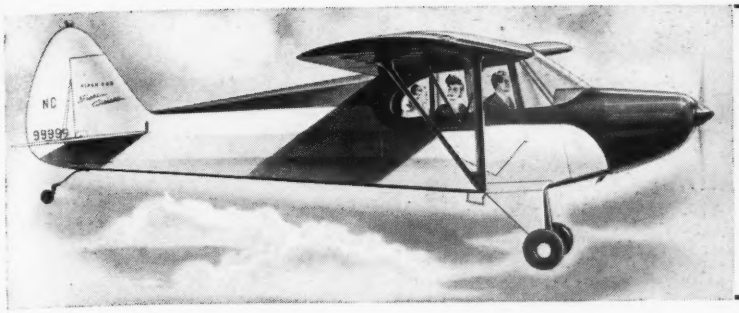
Huntington, W. Va.—AIRPORT—City, 2 landing strips, 500x4,200 ft., plane and auto parking area, Tri-State Airport. $600,000. CAA.

Parkersburg, W. Va.—AIRPORT—City, addnl. plane parking area 150x200 ft., administration bldg., incl. grading, drainage, fencing, Parkersburg-Wood County Airport. $170,400. CAA.

What's New

(*Continued from page* 17)

offered by **Amglo Corp.**, Chicago. It is said to maintain constant speeds regardless of wide variations of voltage. Adaptable for use in aviation signal and obstruction lights, motor's current is stated to vary from .06 to 1w., either from battery or direct current line sources. Small enough to be held in palm of hand, it is available for use at 3, 6, 12, 24, 32, or 110v.



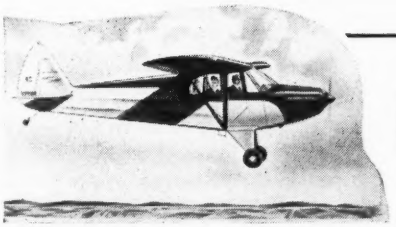
THE PIPER CUB *Super Cruiser*

A 3-PASSENGER PLANE

WITH

100-HORSEPOWER ENGINE

AND



600-MILE CRUISING RANGE

(WITHOUT REFUELING)

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THE Piper Cub Super Cruiser is tops in the moderate price field today for value, safety and economy. See it . . . fly it . . . compare it with other personal planes!

The Super Cruiser seats *three* people. There's power to spare in its full 100-horsepower engine . . . and speed up to 115 miles per hour. You can make fast, safe trips of more than 600 miles at normal cruising speed without refueling . . . and 700 miles at economy cruising speed!

Standard equipment on the Piper Cub Super Cruiser includes many outstanding features for your safety, convenience and enjoyment . . . an auto-type electric starter and generator . . . a two-way, two-band radio that gives both airways and regular broadcast reception . . . dual controls . . . dual hydraulic brakes . . . parking brake . . . one-piece Plexiglas windshield . . . engine muffler . . . cabin heater . . . carburetor heater . . . steerable, full-swivel tail wheel . . . position lights.

Enjoy a free flight demonstration at your Piper Cub Dealer's airport now. Ask him for the full-color Piper Cub literature and the popular books . . . *How to Fly a Piper Cub* and *What Your Town Needs for the Coming Air Age*. Remember —only Piper makes the Cub, that good, safe plane. Piper Aircraft Corporation, Lock Haven, Pennsylvania, U.S.A. . . . In Canada: Cub Aircraft Corporation, Ltd., Hamilton.

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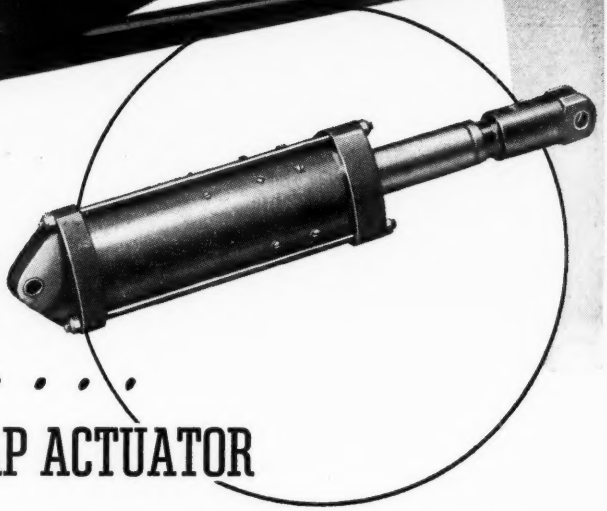
Thanks, Douglas

"Due to the critical nature of the project each component was utilized only after the nation's best authorities decided upon its merit. Your concern may well take pride in its contribution to this aeronautical achievement."



EEMCO's contribution to the revolutionary *Skystreak* . . . . .

This electric-motor-operated WING FLAP ACTUATOR

ANOTHER EEMCO ACHIEVEMENT IN ELECTRICAL ACTUATION

Constructed at least 60 per cent stronger than any combat-type aircraft ever built, the *Skystreak's* high loading dictated *maximum weight saving* on all components. The complicated, crowded interior demanded *extreme compactness* of each accessory. Vital importance of the *Skystreak's* trans-sonic mission called for *utmost dependability* throughout.

The cylindrical, in-line construction of motor and screw jack making up the EEMCO-built Wing Flap Actuator saved maximum weight, required minimum space. Electric-motor-operated, the actuator permitted light, simple wiring, rather than weight-adding, complicated tubing.

Designed to meet the *Skystreak's* staggering operational demands, this EEMCO actuator withstands a static load of 8000 lbs. tension and 12,750 lbs. compression, with an ultimate load of 25,000 lbs. compression.

Here is a typical example of outstanding results when the toughest of design problems are put up to EEMCO. Our services include complete design, development, and manufacture of custom-built motors and electrical actuators.

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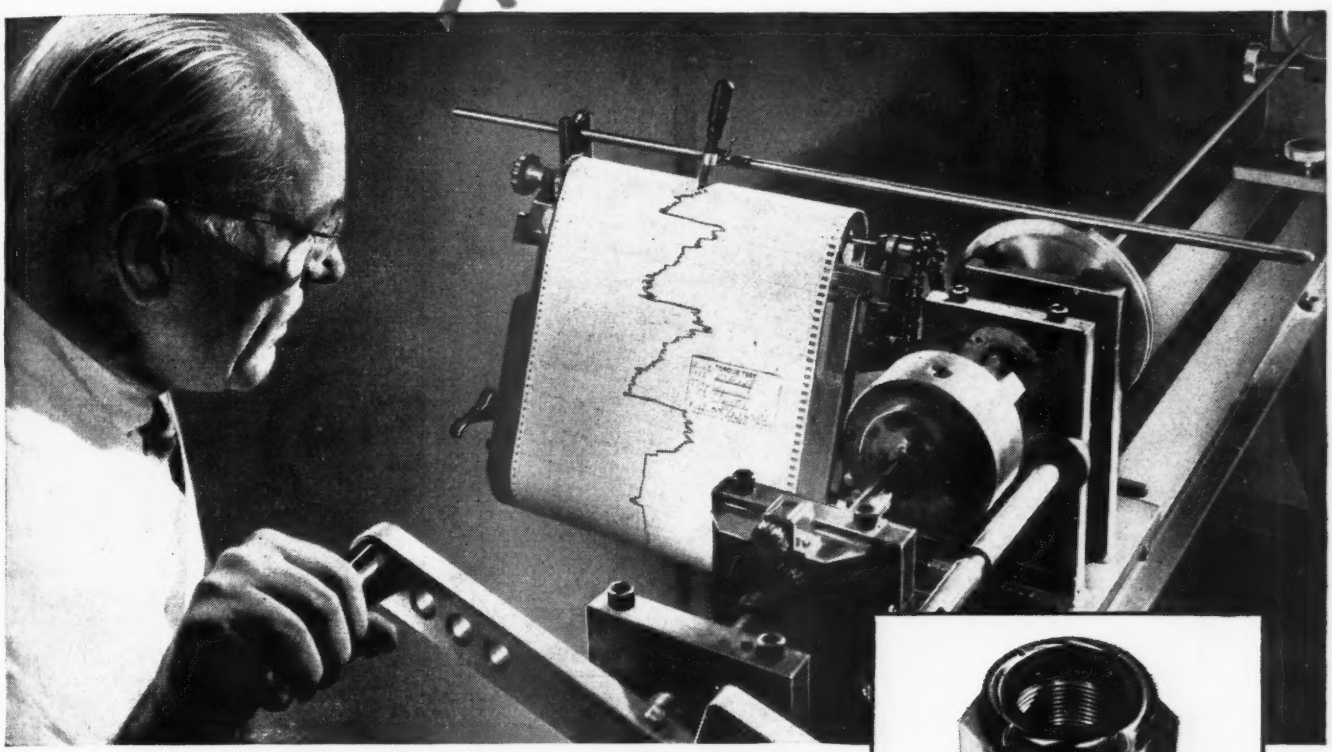
EEMCO

A-N TORQUE TESTS *Prove Reusability* OF ELASTIC STOP NUTS



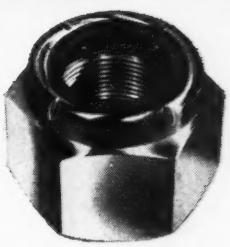
—*the Red Elastic Collar provides dependable locking torque for* RE-USE!

Army and Navy specifications for aircraft lock nuts include a specific torque test to prove locking effectiveness. Lock nuts have to maintain adequate locking torque through 15 on-and-off cycles.

ESNA Elastic Stop Nuts—with the Red Elastic Collar that has become a symbol of security to all aviation engineers—remain self-locking against Vibration, Impact and Stress Reversal in both pre-stressed and positioned settings.

In addition, the self-locking, self-sealing and reusable Red Elastic Collar protects the bolt. It does not deform the bolt, damage the threads or gall the finish.

Reusable ESNA Elastic Stop Nuts provide dependable protection against Vibration, Thread Corrosion, Thread Failure, and Liquid Seepage. This multiple protection—which has made Elastic Stop Nuts the standard fastener on many products—also achieves the double economy of inventory simplification and reduced procurement costs. ESNA engineers are now ready to study your fastener problems. Address: Elastic Stop Nut Corporation of America, Union, New Jersey. Sales Engineers and Distributors are conveniently located in many principal cities.



The RED ELASTIC COLLAR

— denoting an ESNA product —

. . . is threadless and dependably elastic. Every bolt — *regardless of commercial tolerances* — impresses (does not cut) its full thread contact in the Red Elastic Collar to fully grip the bolt threads. In addition, this threading action properly seats the metal threads — and eliminates all axial play between bolt and nut threads.

Torque tests — for Elastic Stop Nuts — are based on a steel-to-steel frictional coefficient of .18. Bolt loadings are figured at 40,000 psi for commercial bolts; 90,000 psi for aircraft bolts.

ELASTIC STOP NUTS

INTERNAL WRENCHING

ANCHOR

WING

SPLINE

CLINCH

GANG CHANNEL

CAP

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IS AS IMPORTANT AS THE WEATHER!

You can't do much about the weather but you can have firm, smooth turf—grass firmly bedded, even in texture—turf that makes for safe landings and easy take-offs.

Tell us your soil, climate and acreage and let us blend you a grass seed that will meet *your* needs. Asgrow grass seeds are scientifically bred and time tested under varying conditions.

High germination and purity

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The Grass Seed blended to meet your conditions

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A-P DAYNITE DISTRESS SIGNAL

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Hand held. Safe. Dependable. *Each signal absolutely watertight. Light—less than 7 oz. Compact—5⅛ long.* 20-second brilliant night flare plus 18-second bright orange day smoke in opposite ends of steel container. Can be seen day or night when overcast would obscure pistol or roman-candle type signals. *Available at all marine and aviation supply dealers. Accept no substitutes.*

AERIAL PRODUCTS, INC., MERRICK L. I. N. Y.

Tools for Flexible Shafts.....18

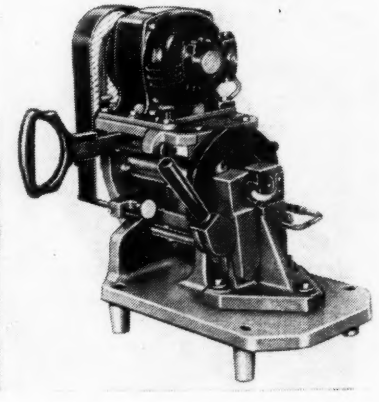
Adaptable for fractional horsepower drives, and employed for filing, grinding, and hammering, new flexible shaft tools are being marketed by **Speedo Mfg. Co.**, New York City. Filing pieces are gear driven and are used for filing small dies, castings, and patterns, beveling, breaking of sharp edges and corners, slotting, piercing, and removing ridges after machining where larger machines cannot be used. Tools are attached to shaft by ball and spring collar. Work is performed at 1,000 to 1,500 rpm., delivering from 500 to 1,500 strokes per minute. Hand pieces come in a ⅛ to ¼ in. stroke with collets which will hold 3/32 or ⅛ in. shank. Filing handpieces weigh about 4 oz. Grinder construction embodies hardened and ground shafts, ball bearings, and interchangeable collets which hold 0 to ⅛ in. shanks. Tool weighs about 3 oz. Hammer is cam driven instrument used largely for hammering, riveting, and peening delicate work. It weighs less than 3 oz.

Ohm's Law Calculator 19

Designed to solve resistance calculations, new Ohm's law calculator announced by **Ohmite Mfg. Co.**, Chicago, is stated to give answer to any resistance problem with one setting of slide, reading in ohms, volts, amperes, and watts, to solve parallel resistance and series capacitance problems, divide, multiply, and find squares and square roots. Range is said to cover all currents, resistances, voltages, and wattages found in industrial and radio work. Computing scales are printed on one side. Other side gives composition resistor color code and catalog number of stock resistors and rheostats of different resistance values. Size of calculator is 9 x 3 in.

Tube Cutting and Flaring 20

Designed to cut, flare, and trim copper or aluminum tubing in one operation, new electric tube cutting and flaring machine announced by **C. J. Unger Mfg. Co.**, Dayton, Ohio, has a capacity of more than 5,000 flares in 8 hr. of operation. Standard swedging operations



can also be produced by installing a swedging mandrel in place of flaring tool. Since work does not revolve, machine can handle any length tubing from ¼ to ¾ in. o. d., inclusive. Motor is 1/3 hp.

Swing Table 21

Suitable for cleaning large, bulky, and fragile pieces that would normally re-

quire an airblast room, new 48 in. "Wheelabrator" swing table is made by **American Wheelabrator & Equipment Corp.**, Mishawaka, Ind. Machine is equipped with one 19½ x 2½ in. airless blast cleaning unit.

Telegraphic Code Writer.....22

Similar in appearance and operation to an electric typewriter, new code writer made by **Selectograph Mfg. Co.**, Colorado Springs, Colo., has characters automatically timed to vary speed up to 60 words per minute. It is said to be adaptable for use in planes and can be used for self-instruction. Code is send by instrument through a series of cams operated by a friction drive. An interlocking key mechanism prevents striking a key while a cam is in action. A repeater key can be used for self-instruction at any speed desired. It has an electronic oscillator and loudspeaker monitor, with jacks for headphones or remote loud speaker. Speed of transmission is controlled by a speed selector and a calibrated speed indicator is mounted on instrument. Writer is motor driven and may be equipped for any a.c. or d.c. voltage specified. Machines are available for International, American Morse, or other code as desired.

Power Screw Drivers.....23

Featuring pneumatic pick-up which enables operator to pick up screws with air suction finder, two pneumatic screw drivers, introduced by **Keller Tool Co.**, Grand Haven, Mich., are designed for use wherever small screws are to be driven on a production basis. Size 12A-1 (Model 1671) has a free speed of 2,500 rpm. and is intended for operations using free running machine screws up to size No. 3 and small self-tapping and wood screws. Size 12-A-1C (Model 1672) has a free running speed of 10,000 rpm. and accommodates screws from No. 3 to No. 6. Impacting force of built-in clutch gives this model added drive. Weight is 8 oz., length is 5½ in., and outside dia. of housing is 1 1/16 in. Bits and finders to fit screws from No. 0 through 6 are available and are interchangeable in sets.

Metal Parts Cleaner.....24

Bendix Products Div., Bendix Aviation Corp., South Bend, Ind., announces improved metal parts cleaner designated as "Bendix Metalclene". For use in aviation repair shops, it is designed to quickly remove deposits from metal surfaces, including small corners and channels, without hand scraping and brushing, and without damaging base metals or alloys. It is stated to work with a physical rather than chemical action, its wetting action described as creeping in and lifting foreign coatings from metal surfaces by destroying bond, rather than eating away or dissolving grease and carbon by chemical action. Because of this, original strength is reported retained. Foreign material sinks to bottom of container, where it is readily removed.

Drafting Scale 25

Incorporating eight different scales on one side of plastic instrument, giving calibrations of ⅛ to 3 in. per foot, new "Vant Rule" drafting scale is being marketed by **Stewart-Jackson Instru-**

T. G. Henning CO.

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U.S. Gauge's forty years of experience in manufacturing the world's most accurate instruments, is your guarantee that Supaire Aircraft Instruments "always tell the truth."

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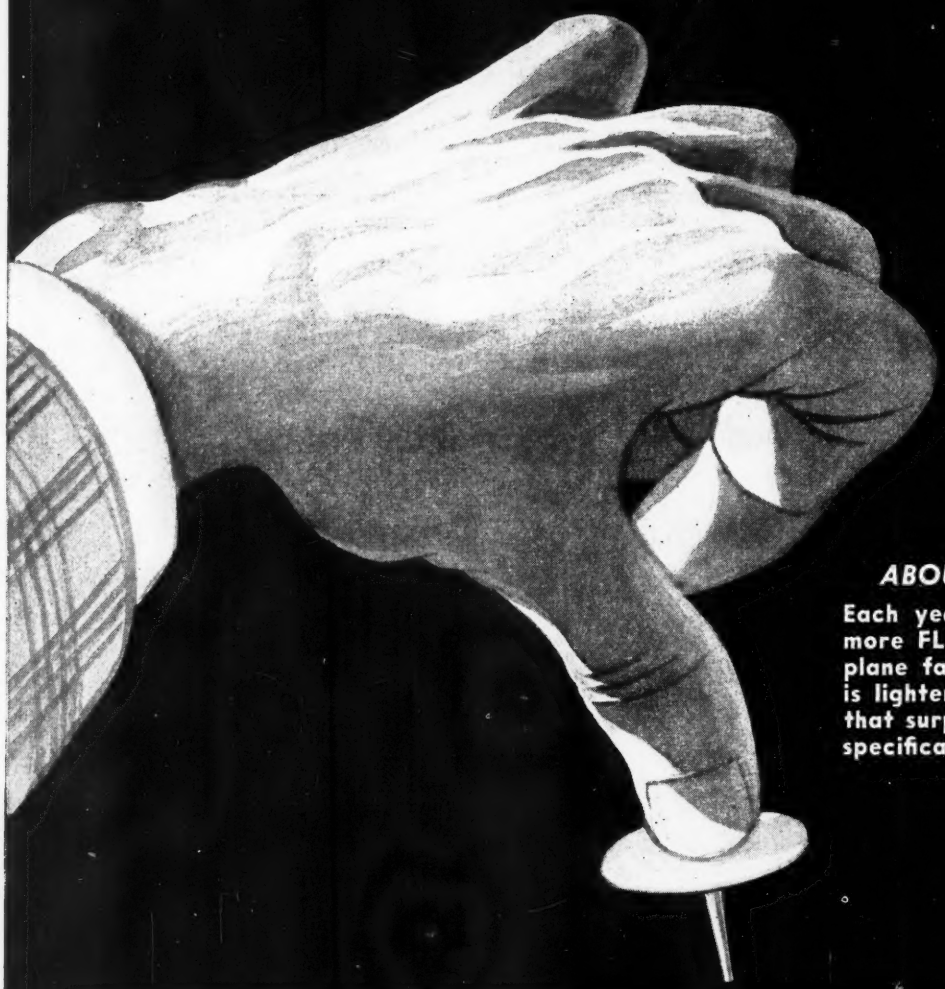
Let's Get Down to Brass Tacks



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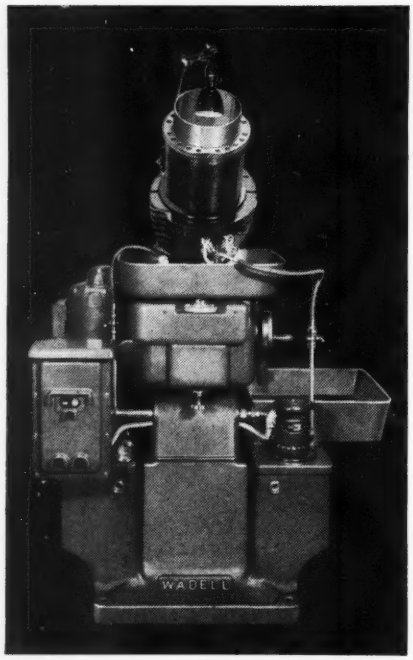

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ment Co., Los Angeles. It is made of .125-in. material with all edges beveled and numerals and calibrations in red. Overall length is 13½ in. Scales read to 12 in.

★ Information Tips ★

ENGINEERING & PRODUCTION

Insulating Materials 26

Covering data on insulating materials, catalog has been issued by **H. I. Thompson Co.**, Los Angeles, as a reference in planning and specifying company's insulation, such as Thermo-Cousti Fiberglas blankets (sample of material included), Refrasil, 2,000-deg. high temperature insulation, etc.

Springs 27

Accurate Spring Mfg. Co., Chicago, announces publication of third edition of "Handbook of Technical Data on Springs," containing information on design formulation, load deflection, and methods of specifying springs.

Welding Information 28

"Here is Information on Eutectic" is new folder issued by **Eutectic Welding Alloys Corp.**, New York City, containing data on low temperature welding rods for torch and furnace applications and low temperature electrodes for arc welding.

Flame Cutting 29

Showing typical flame-cut sections, new bulletin from **Joseph T. Ryerson & Son**, Chicago, describes company's facilities for producing plain and intricate shapes from steel plate by flame cutting method.

Precision Hole Location.....30

Containing review of all hole location practices and their evolution, new book, "Precision Hole Location for Interchangeability in Toolmaking and Production," is available from **Moore Special Tool Co.**, Bridgeport, Conn. Maker will quote price of book to interested parties.

Oil Dilution Calculator 31

Developed to compute quantities when mixing or diluting oils, new calculator, "Dilut-O-Graph," is available from **D. A. Stuart Oil Co.**, Chicago. It is of 4½-in. dia.

Profilometer Tracer 32

Bulletin from **Physicists Research Co.**, Ann Arbor, Mich., describes Type MA profilometer tracer, stated to eliminate adjustment of tracing point to surface being measured.

Cutting and Welding 33

Air Reduction Sales Co., New York City, has announced publication of new catalog of welding and cutting products containing two sections—one for oxyacetylene welding and cutting gases, equipment, and supplies; other for arc welding machines, accessories, and electrodes.

ELECTRICAL

Infra-Red Lamps 34

Containing descriptions and technical data on infra-red industrial heat lamps, new folder, No. Y-689, from **General Electric Co.**, Cleveland, Ohio, also describes four main types of ovens used and shows applications.

Magnet Charger 35

Specifications and description of new magnet charger, Model 107, are given in folder from **Radio Frequency Laboratories**, Boonton, N. J. Catalog page from same company describes "Sealnut" unit, a mounting and sealing combination for control shafts and switches, designed to keep out dirt, water, or gas.

Machine for Stripping Wire.....36

Folder from **The Williams Products Co.**, Middletown, Conn., describes "Codeco" wire stripping machine, which strips, cuts,

"Maguire has his own ideas of what should go in a yearbook"

and slits one, two, and three conductor wire up to ½ in. dia.

Wire Stripper 37

Using two electrically heated stripping blades, new wire stripper designed to strip cotton, silk, synthetic insulation, or rubber covering from fine stranded or solid conductors, is described in new leaflet from **Ideal Industries**, Sycramore, Ill.

Electrical Equipment 38

Bulletin No. 208 from **Electric Products Co.**, Cleveland, covers line of electrical equipment, including electrolytic, battery charging, and diverter-pole motor generators, and frequency changers, industrial dynomometers, and synchronous motors and generators.

Relays 39

Containing engineering information, including coil resistance, voltage, contact data, sensitivity, insulation, and dimensions on line of electrical relays, new manual is announced by **Wells Sales, Inc.**, Chicago.

PLASTICS & SYNTHETICS

Strippable Plastic Coating.....40

Applied by either brush or spray, "Spray-Peel" made by **Eronel Industries**, Los Angeles, is now available to industry. It is a non-toxic compound developed during war for military use for protection of aircraft during shipment overseas or in extended storage.

Protective Coating 41

Folder from **United Chromium, Inc.**, New York City, gives properties, application data, and typical uses of "Ucilon," synthetic protective coating developed to resist severe corrosive conditions.

Packaging Plastic 42

"Cocoon," new plastic protective packaging material made by **R. M. Hollingshead Corp.**, Camden, N. J., is covered in new folder telling what it is, when it is used, and how it is applied. Included are technical facts and figures.

AIRCRAFT & ACCESSORIES

Aluminum in Aircraft 43

Issue No. 16 of "Aluminum Progress", distributed by **Reynolds Metals Co.**, Louisville, Ky., includes illustrated item on use of aluminum in Ryan "Fireball".

Aircraft Servicing 44

Containing information on aircraft servicing, including maintenance and reconversion, new booklet issued by **Kelite Products, Inc.**, Los Angeles, gives special attention to camouflage removal and preparation of aluminum for refinishing.

Aluminum Aircraft Parts.....45

Items on use of aluminum in Piper, and Luscombe personal planes appear in December issue of "Aluminum News Letter", circulated by **Aluminum Co. of America**, Pittsburgh.

AIRPORTS

Service Equipment 46

Greer Hydraulics, Inc., Brooklyn, N. Y., is distributing new brochure describing "ServiCenter", listing and illustrating company's units for servicing aircraft systems and components.

Fuel Truck 47

Having a tank capacity of 200 gal., new one-man "Airport Gasporter", Crosley powered fuel truck, is described in bulletin issued by **Engineering Research Associates, St. Paul, Minn.** Truck is 130 in. long, 48 in. wide, and weighs 1,400 lb. Servicing capacity of equipment is 25 gal. per min.

Erratum: In our February issue, the article "Design Development of the Douglas XB-42," by Carlos C. Wood, was inadvertently footnoted as being based on a paper presented before a Los Angeles SAE meeting. Note should have read, "presented before Los Angeles section, Institute of Aeronautical Sciences."

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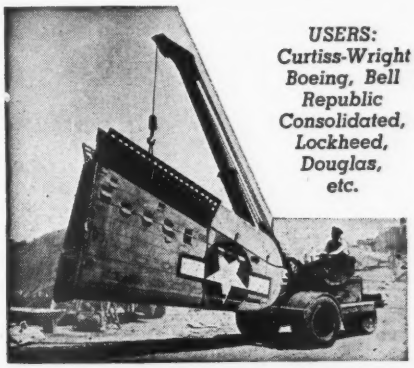

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WRITE FOR BULLETIN 802

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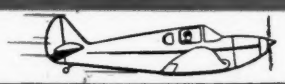

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TRUARC rings lock piston pins securely for drilling engine on 24-hour service

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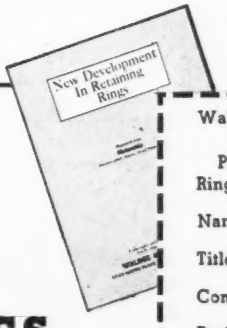

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* Covered by Christensen United States Patent No. 2,180,795; all "O" Rings sold by Linear are manufactured under royalty agreement with patentee.

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"O" RING STATIC SEAL FOR PISTON. Permits the use of a straight piston rod and snap ring retention of piston.

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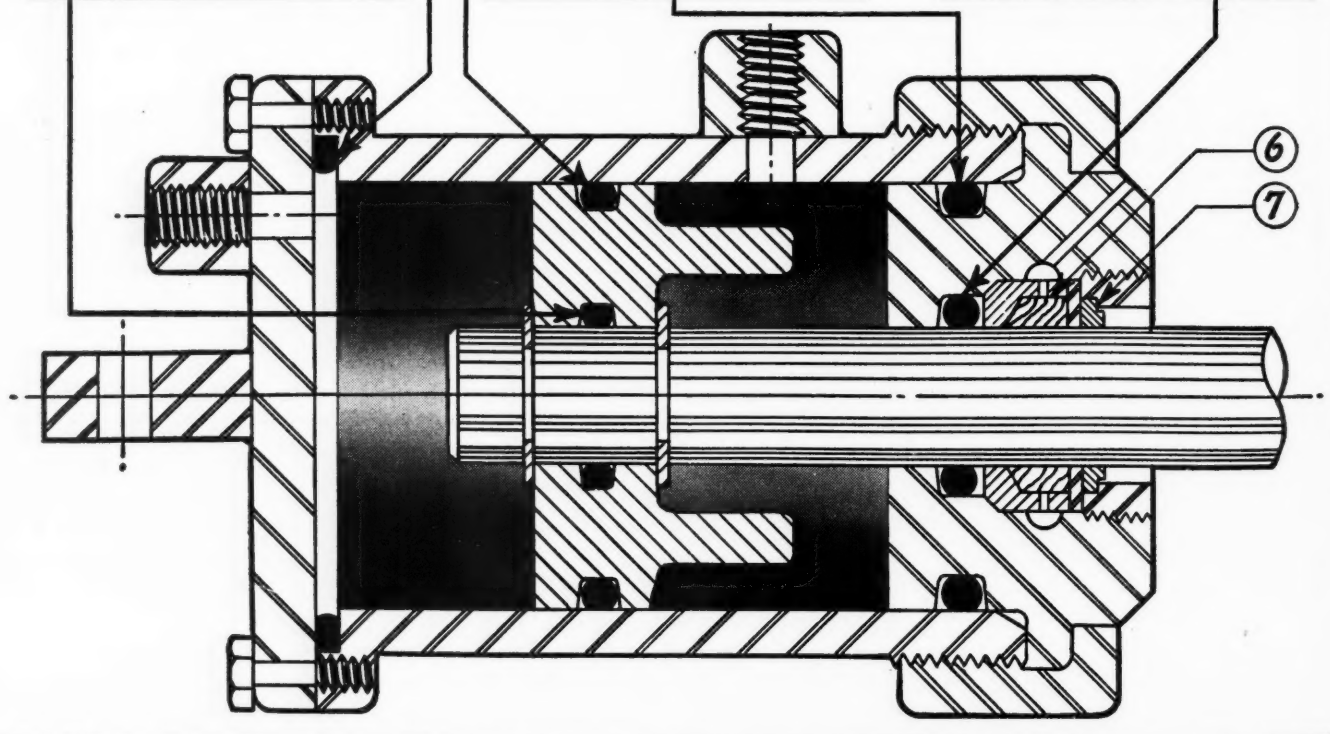
PISTON ROD SEAL. Installed in conjunction with felt lubricator washer (6) and bronze piston rod scraper ring (7). Lubricating washer should be employed in air-actuated equipment or where adequate lubrication is not supplied from pressure medium. Scraper ring is recommended where accumulations of caked mud, dirt, or ice are likely to adhere to piston rod.



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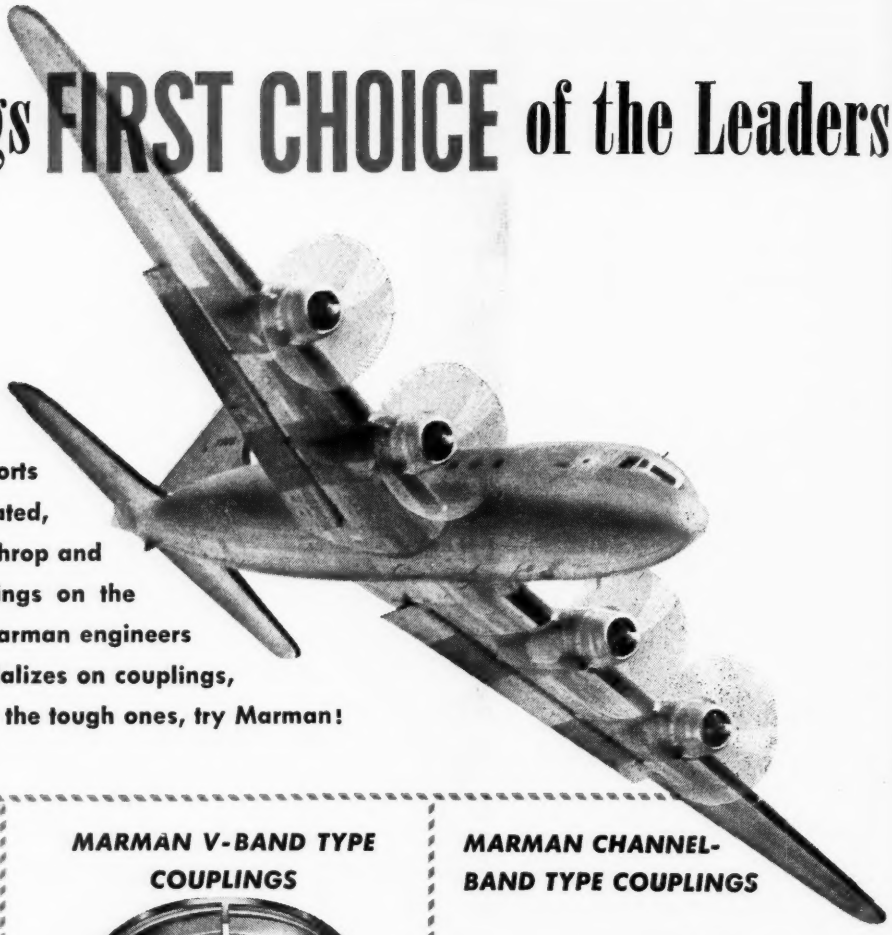
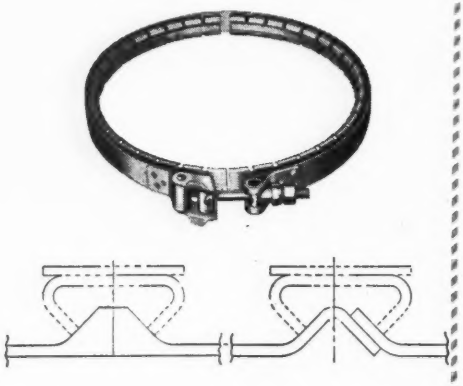


IN the new giant transports manufactured by Boeing, Consolidated, Douglas, Lockheed, Martin, Northrop and Republic, you'll find Marman Couplings on the critical installations. The reason is Marman engineers couplings to the job . . . . . specializes on couplings, clamps and straps. For the tough ones, try Marman!

MARMAN MANIFOLD COUPLING-HIGH TEMPERATURE



Particularly suitable for joints that require positive seal at high temperatures. The coupling is vented and will remain at one-half the temperature of the manifold, thus providing extra safety from fatigue failures common under excessively high temperatures. Available in several types for joining manifolds with either machined or rolled flanges. Stabilized stainless steel material used for both the clamp band and the retainer insert.

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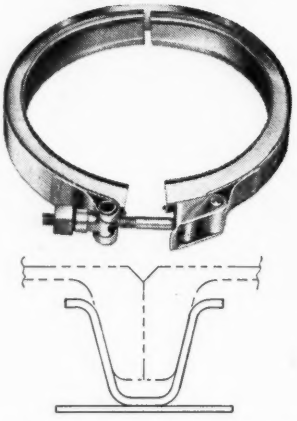

Provide an effective seal for high temperature ducts and other joints by appyling even axial pressure on duct flanges. Available with either a continuous ring, or with a split ring adapted to installations where it is necessary to have the coupling opened completely for assembly. The high strength stainless steel material makes possible light weight construction capable of handling relatively high pressures.

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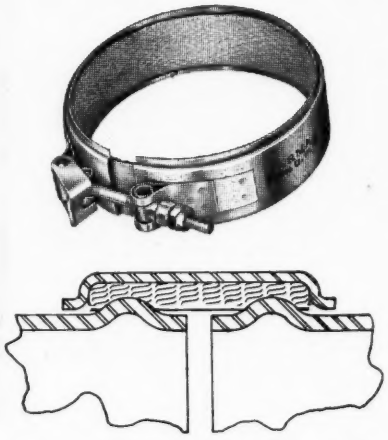

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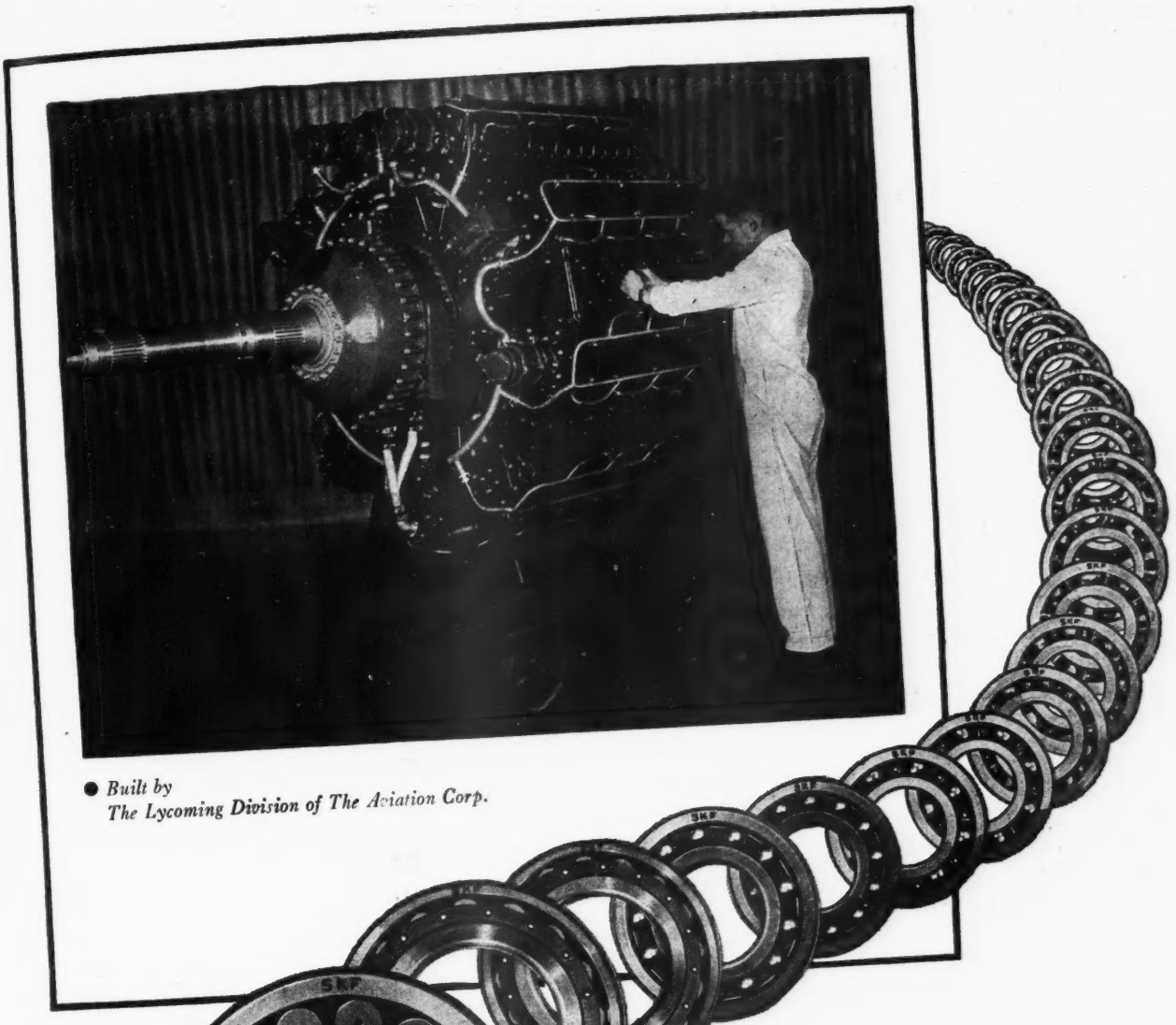

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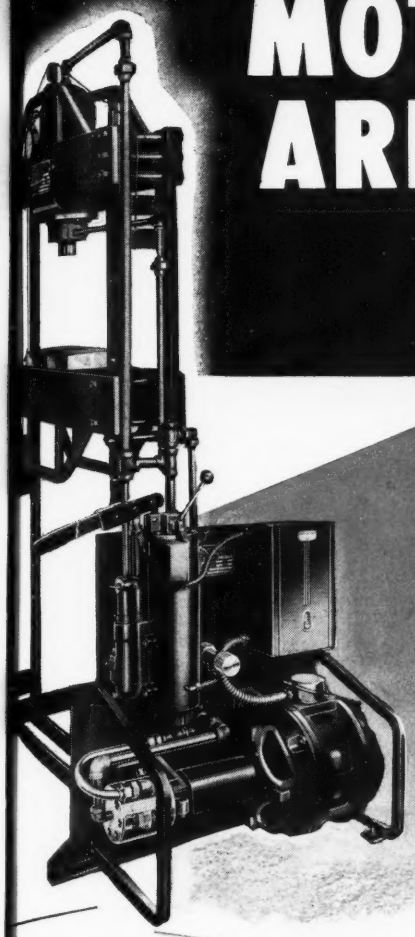

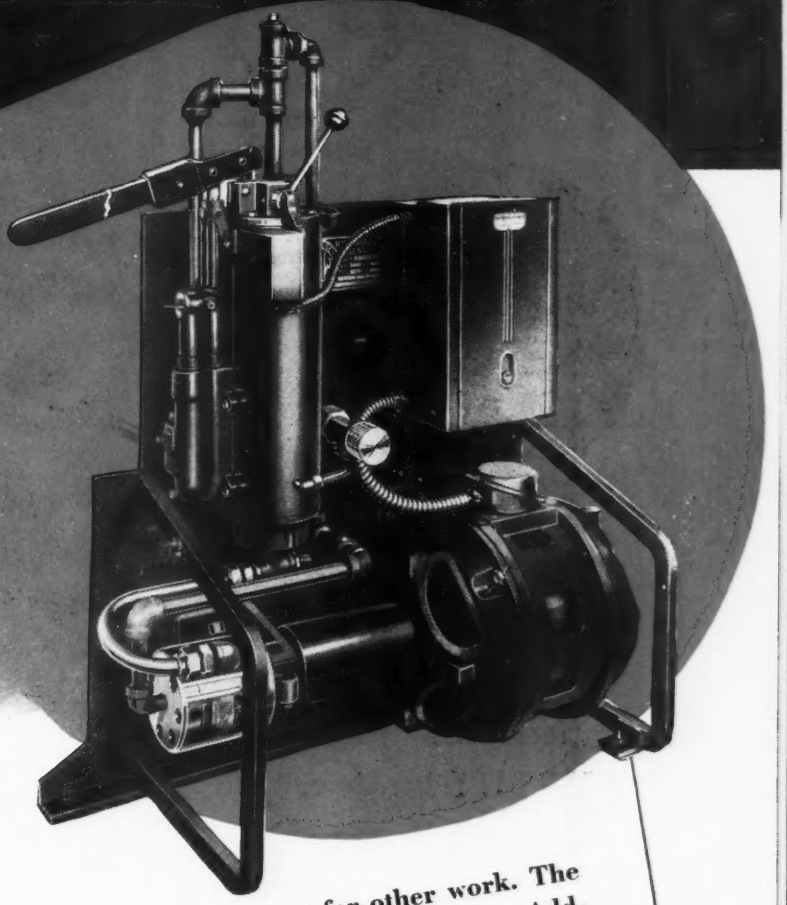

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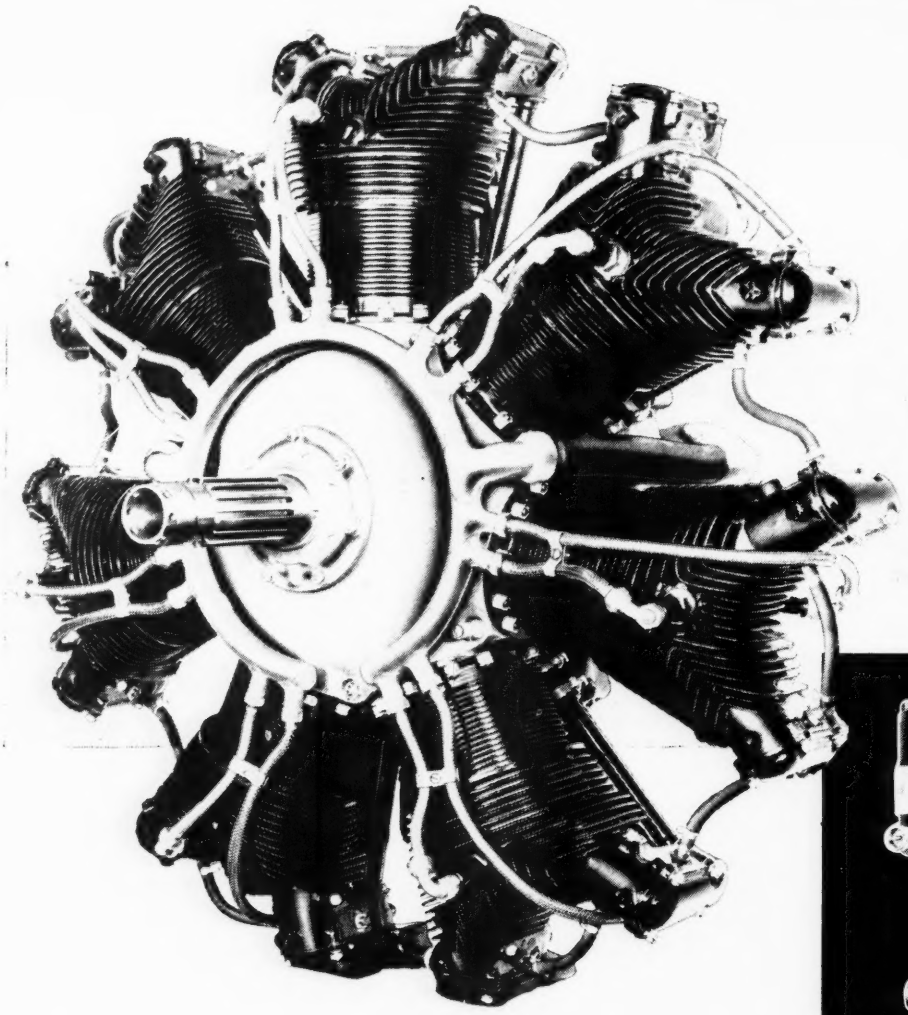

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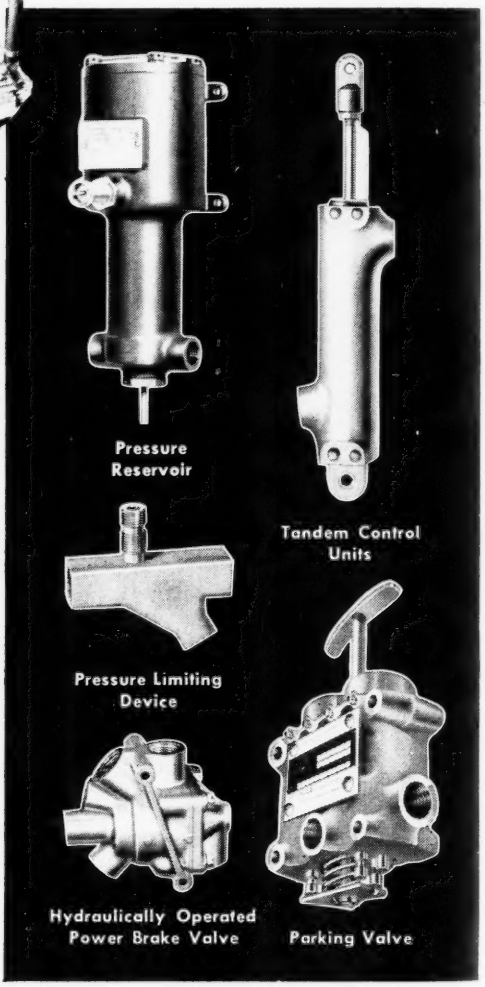

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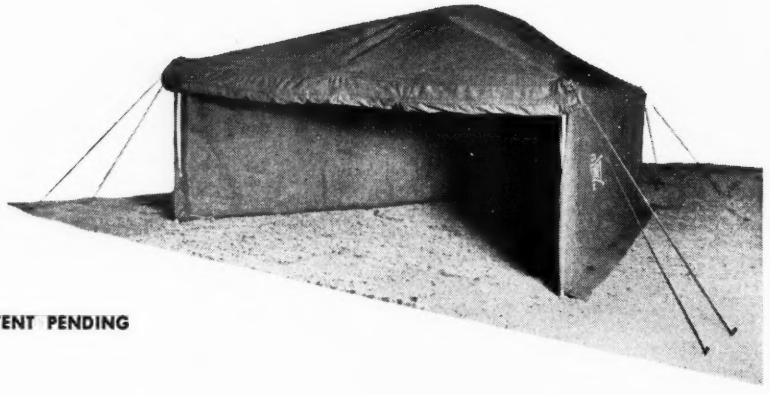

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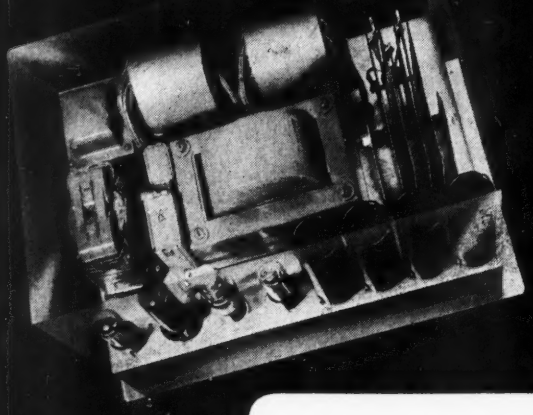

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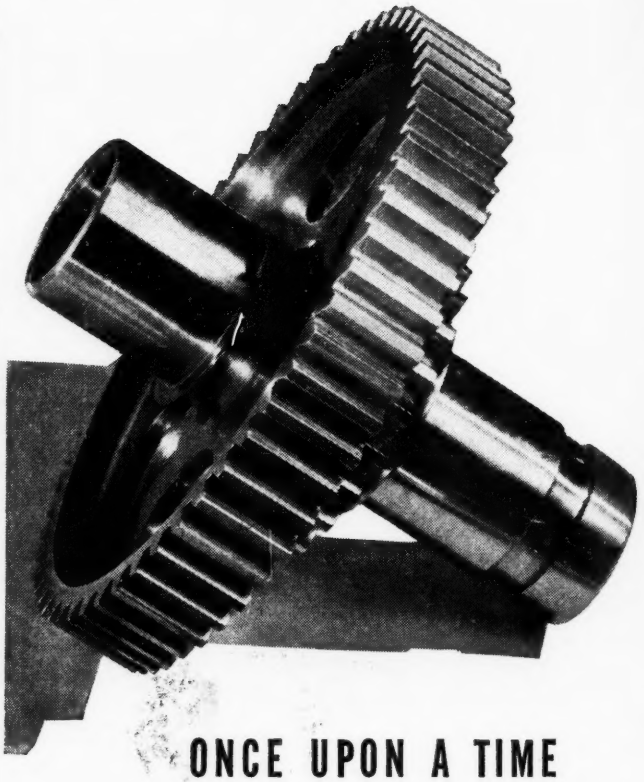

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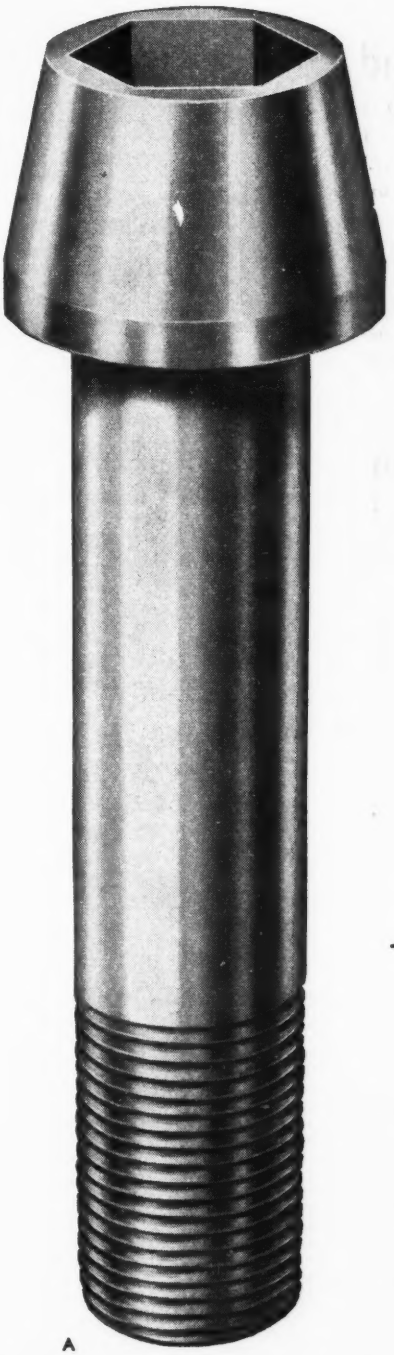

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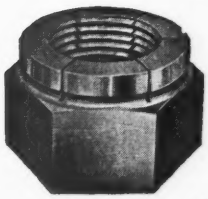

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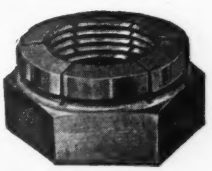

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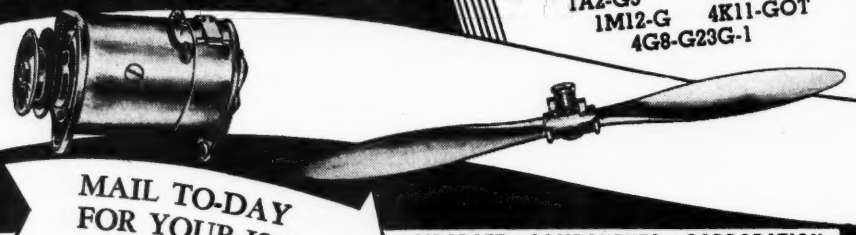

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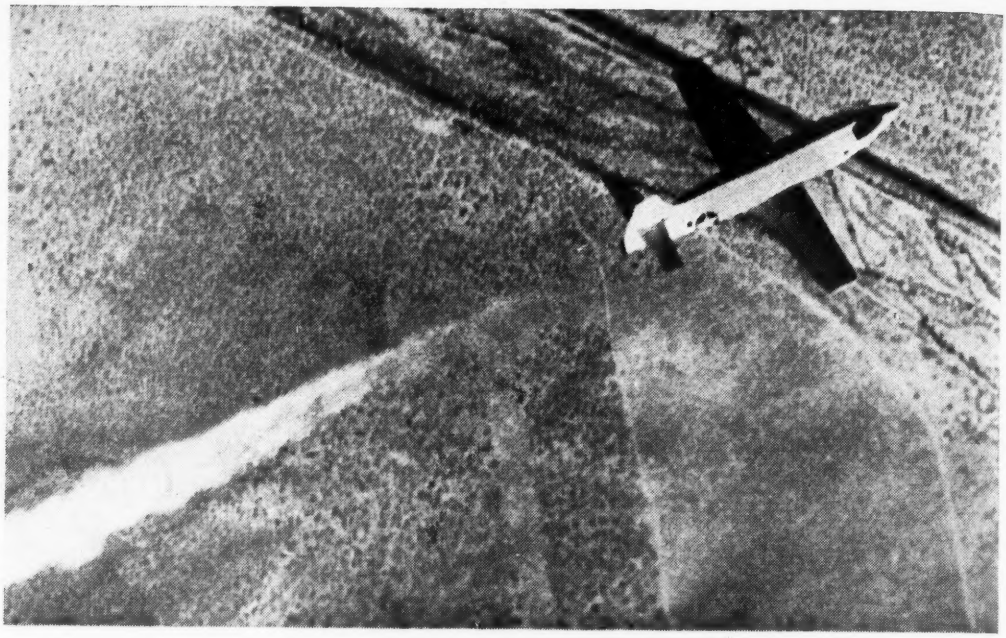

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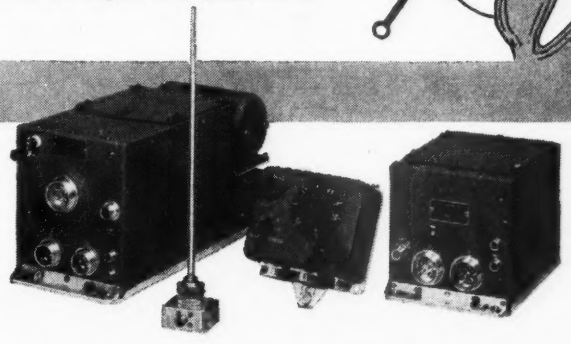

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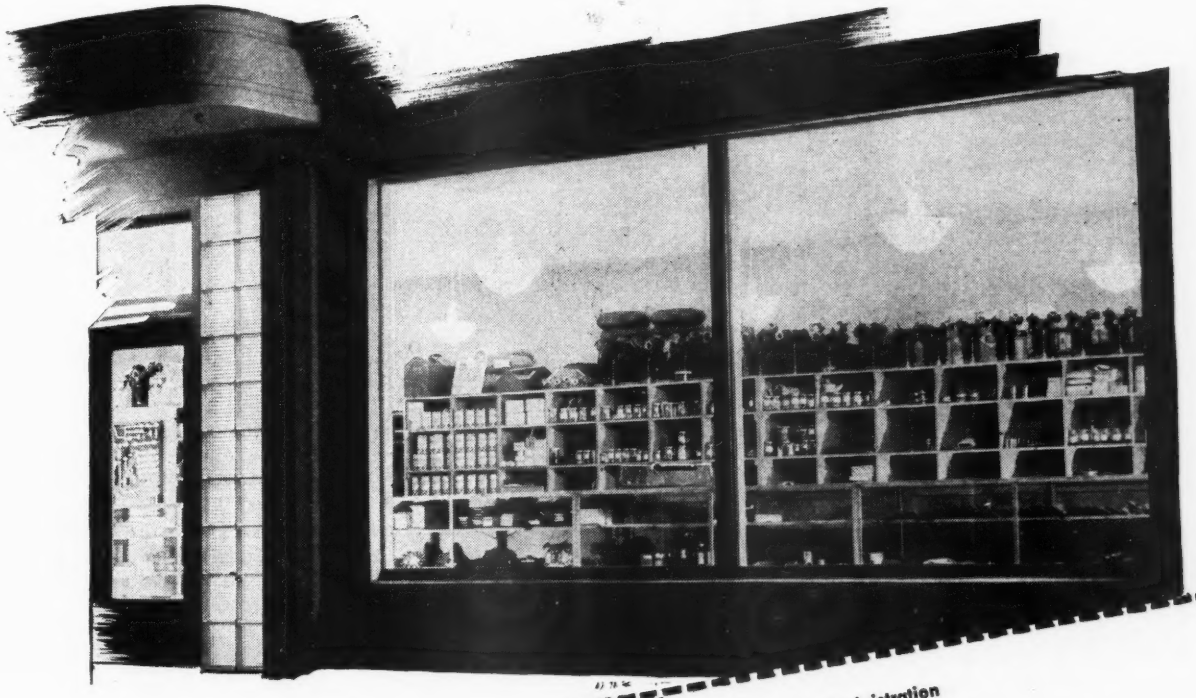

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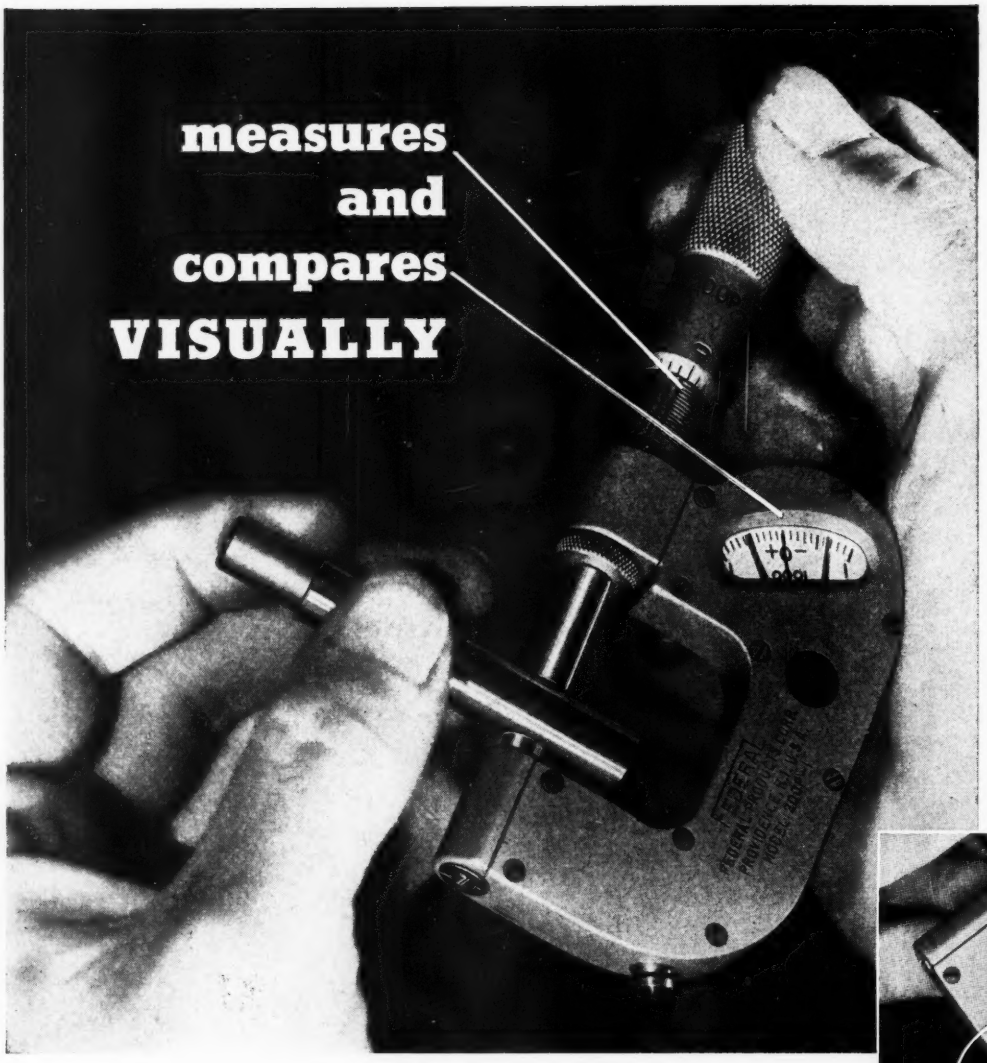

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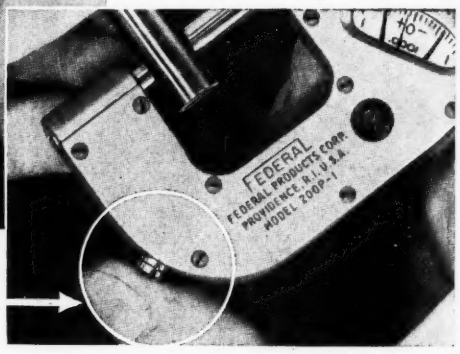

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● Dimensional Dial Indicators and Indicating Gages — mechanical, electronic, air, multi-dimensional • Automatic Sorting • Dimensional Machine Control • Combinations of these methods.

Eaton E-100 Sodium Cooled Valves and *Zero-Lash* Hydraulic Valve Lifters

Registered U. S. Patent Office

Ideal Combination for the New Higher Compression Engines

Today's trend toward engines with higher compression ratios to utilize modern fuels involves materially higher operating temperatures, and places a heavier load on valves and valve gear.

The combination of the Eaton E-100 Sodium Cooled Valve and the *Zero-Lash* Hydraulic Valve Lifter insures perfect seating, proper valve timing at all speeds and temperatures, permits lower idling speeds, and adds materially to valve life.

Eaton has anticipated the requirements of the higher compression engines in developing the new E-100 Sodium Cooled Valve faced with Eatonite, and a specially developed type of *Zero-Lash* hydraulic self-adjusting unit for overhead engines.

Eaton engineers will welcome an opportunity to discuss the application of sodium cooled valves and hydraulic valve lifters to engines now in the design stage.

★

POPPET VALVES • SODIUM COOLED VALVES
TAPPETS • HYDRAULIC VALVE LIFTERS
VALVE SEAT INSERTS • ROTOR PUMPS
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leading aircraft instruments – by the *instrument leader!*

Model 888

Weston *Cross-Pointer Indicator* (ID-48)

—used with Instrument Landing Systems

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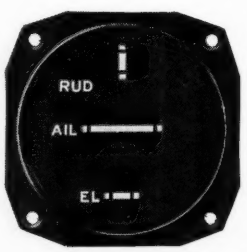
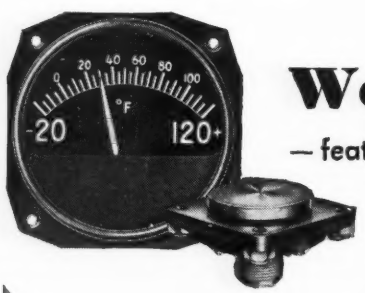


Model 883



Weston *Free Air Thermometers*

— featuring the new flush mounting Resistance Bulb

***FOR ADDITIONAL INFORMATION** write Weston Electrical Instrument Corporation, 616 Frelinghuysen Avenue, Newark 5, New Jersey.*

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Built to Withstand Mayhem

AN AIRCRAFT VALVE is subjected to all forms of violence. It is blasted by white-hot gases and its head pounded against the valve seat twenty times or more each second. Friction attacks it from the sides, while the stem tip takes the trip-hammer blows of the camshaft.

Yet the Thompson Sodium-Cooled Aircraft Valve takes this heat, wear and battering for thousands of flying hours before replacement is necessary.

That is why you will find Thompson Sodium-Cooled Valves so universally used as original equipment by leading American aircraft engine builders.

1. **Steel developed especially for aircraft service.**
2. **Hard alloy steel ring where valve contacts valve seat.**
3. **Heat-resistant alloy to protect valve head from hot combustion gases.**
4. **Nitrogen-impregnated stem to resist frictional wear against valve guide.**
5. **Sodium content liquefies under engine heat to cool valve head.**
6. **Hard alloy tip to resist camshaft pounding.**

The Thompson Aircraft Valve is only one of hundreds of hardened and ground parts made by Thompson for all types of aircraft engines, including jet turbine wheels and nozzle diaphragms.

Thompson Sodium-Cooled Aircraft Valve and cross-section view showing important design features.

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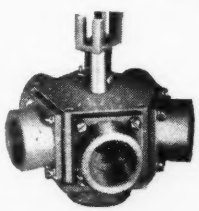
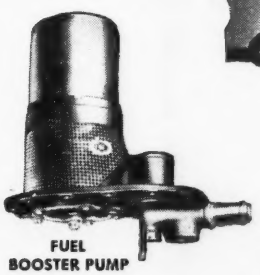
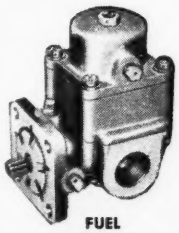


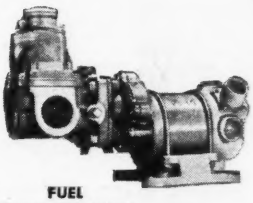
FUEL SELECTOR COCK



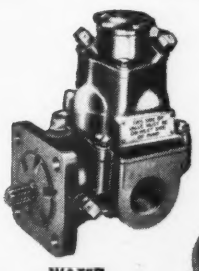
FUEL BOOSTER PUMP



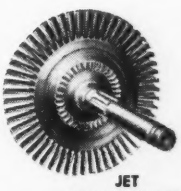
FUEL PUMP



FUEL TRANSFER PUMP

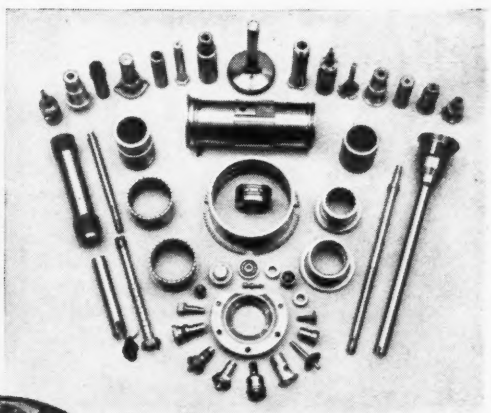


WATER INJECTOR

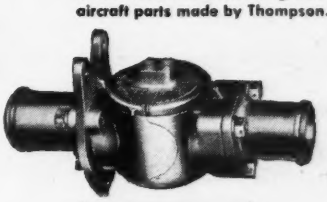


JET TURBINE WHEEL

TURBO SUPERCHARGER



A few of the hardened and ground aircraft parts made by Thompson.



"QUICK-DISCONNECT" HYDRAULIC COUPLING

Douglas DC-4/DC-6 Pressure Regulator

Remotely Operated 3/8" Selector Valve

Geneva-loc Operated 1/2" Selector Valve

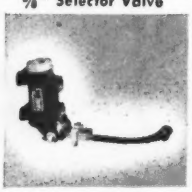
5" Accumulator

Pilot Valve for Remote Operation

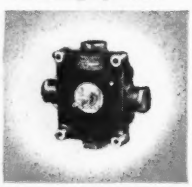
Positioning 3/8" Selector Valve

Geneva-loc Operated 3/8" Selector Valve

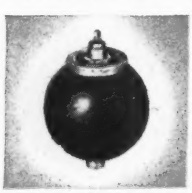
Actuating Cylinders



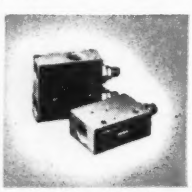
Power Brake Valve



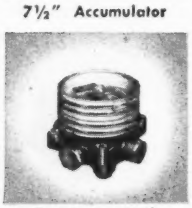
1/2" Selector Valve



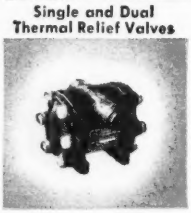
7 1/2" Accumulator



Single and Dual Thermal Relief Valves

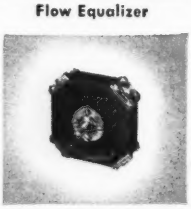


Positioning 1/2" Selector Valve



Flow Equalizer

Hand Pump



3/8" Selector Valve

Remotely Operated 1/2" Selector Valve

Pressure Regulator

COMPARE!

—AND YOU'LL SPECIFY BENDIX-PACIFIC 3000 PSI HYDRAULIC CONTROLS

	BENDIX	MAKE A	MAKE B
1. PROVEN RELIABILITY	✓		
2. LIGHTER WEIGHT	✓		
3. EASE OF SERVICE	✓		
4. ADVANCED ENGINEERING DESIGN	✓		
5. LOWER COST	✓		
6. PROMPT DELIVERY	✓		

COMPARISON proves that this complete line of hydraulic controls is the most advanced 3000 PSI equipment available today. Reliability has been achieved by sound engineering and proved by exhaustive tests in the Bendix-Pacific Hydraulic Laboratory . . . then further proved in military and airline operation in more than 21 models of airplanes during the past two years.

Bendix engineers have achieved minimum weight without compromising absolute reliability. For example, a Bendix-Pacific Regulator, now in airline service, is 31% lighter – yet surpasses the performance of previous equipment.

Ease of service is another Bendix-Pacific advantage, as has been demonstrated time and again . . . poppet-type valves effectively eliminating all hard-to-service lapped fits.

Advanced design – typified in the Bendix-Pacific continuous shell Accumulator – is further proof of engineering superiority. The 7½ inch Accumulator, which Douglas specifies on the DC-6, offers a 22% weight saving, yet gruelling fatigue tests show it to be 50% stronger than any other accumulator.

Important, too, is the fact that most of the items shown are available for prompt delivery. A wire, phone call or letter will bring you accurate information on any specific item. A convenient file-size booklet on this equipment is also yours for the asking. Write today for this new 1947 3000 PSI Equipment booklet No. BA-104.

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Bendix-Pacific 3000 PSI Hydraulic equipment is used on: Consolidated-Vultee B-36, C-99, "X" Pursuit and Model 240; Douglas C-54, DC-4, C-74, DC-6, AD-1, XA-42 and "X" Fighter, Grumman "X" Bomber; Lockheed XR60-1; Martin 303; North American B-45, P-86 and FJ-1; Northrop B-35, B-49 and "X" Pursuit. **© 1947, Bendix Aviation Corp.**

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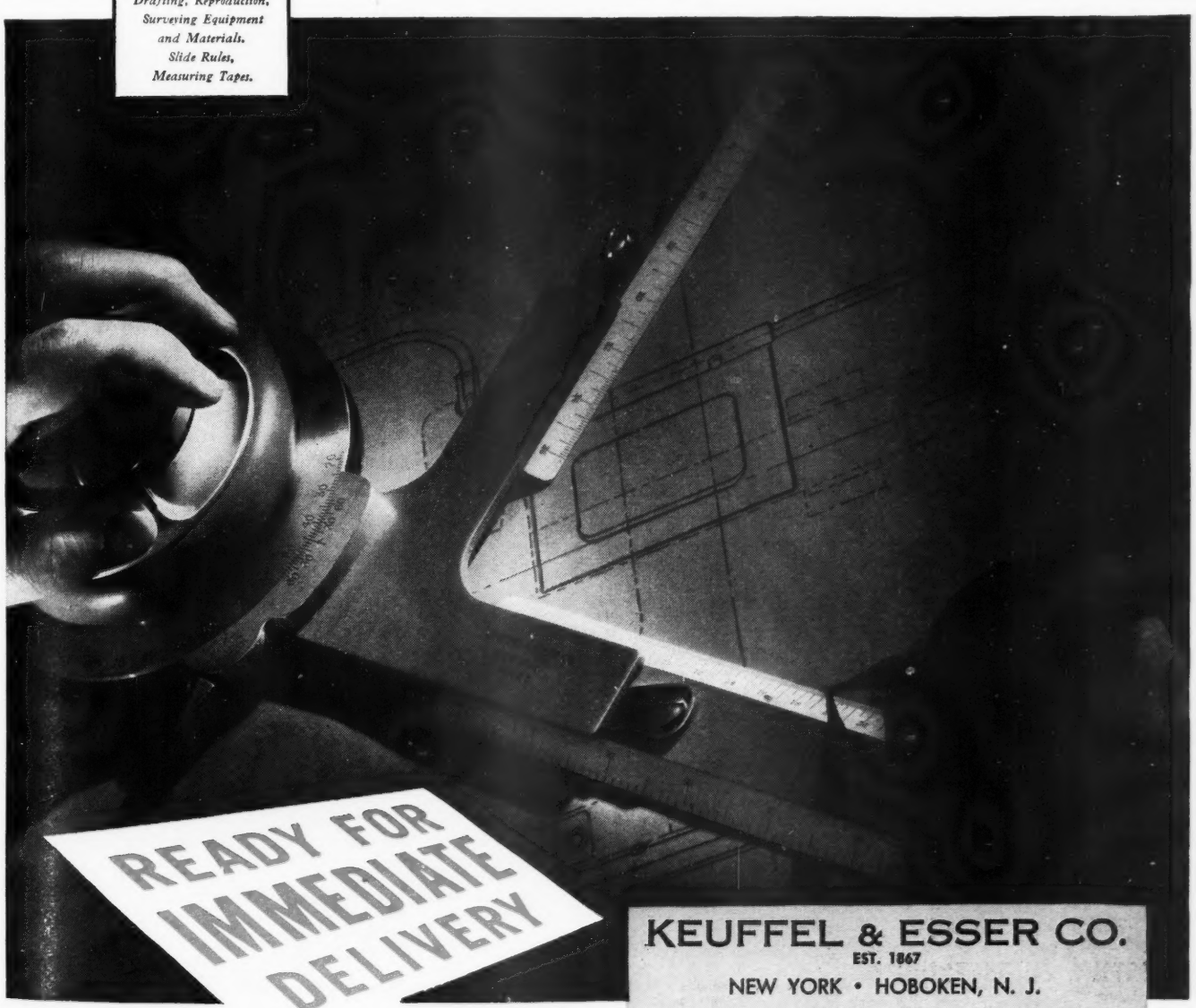

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WHAT DOES *Automatic Control* MEAN TO AVIATION?

IN ANY FIELD . . . . new accomplishments open new opportunities for further achievement. So it is with the application of automatic control to aviation. *The significant meaning* is the new opportunities for progress provided by automatic control applications. Already recognized are such contributions as the Honeywell Electronic Autopilot and Electronic Turbo Supercharger Regulator, standard equipment with the AAF. Add to these the Electronic Fuel Gage and Cabin Temperature Control System and you have an insight into the broad range and versatility of applications for automatic control. By their performance, Honeywell automatic controls have won acceptance in military and commercial aviation. And it is this very acceptance that verifies the progress achieved today and makes certain of new progress tomorrow. Minneapolis-Honeywell Regulator Company, 2675 Fourth Avenue South, Minneapolis 8, Minnesota. In Canada: Toronto 12, Ontario.

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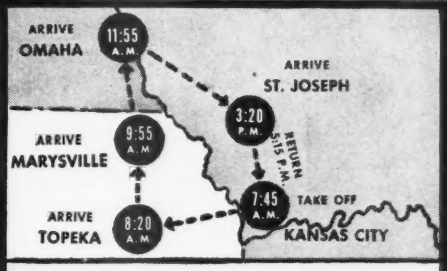
Here's a salesman who has doubled his effective selling time. He covers 350 to 500 miles a day—sells 4 or 5 customers in as many different cities—and still gets home at night!

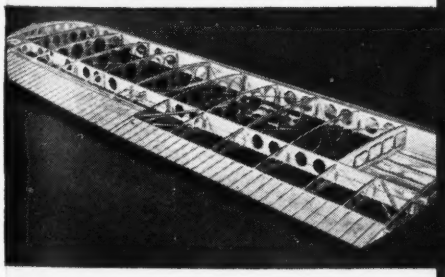
He does it winter and summer—in safety and comfort. He flies a Cessna 140

You can increase your selling efficiency with a Cessna 140. This roomy, 2-place plane has a range of 450 miles on 25 gallons of fuel . . . a service ceiling of 15,500 feet . . . a top speed of over 120 m. p. h. Yet it delivers for only $3245.00 (f. o. b. Wichita).



Typical Trip—382 miles, 4 successful selling stops, 3 hrs. 45 min. actual flying time. Two morning calls—lunch with customer in Omaha—a stop at St. Joe—home for dinner, 6 P. M.

You're Safer on More Fields: Cessna's patented, maintenance-free, safety landing gear makes take offs and landings easier—helps smooth bumps—actually combats ground looping tendencies.



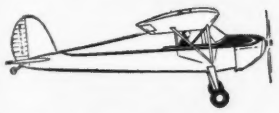
Minimum Maintenance: Cessna's all-metal construction is impervious to damp or dry climates. Your Cessna is built to give you greater safety and greater performance for a longer time.

Carry 80 lbs. of Luggage with you. Brief cases and samples as well as your own suitcase. In fact, two people can each carry as much luggage as the airlines allow without extra charge.

There's Extra Luxury in Cessna's new interior . . . extra comfort, too. New foam-rubber seats. New rainproof directional ventilation system. Cabin heater can easily be installed for winter comfort.

8 REASONS WHY OPERATORS REPORT INCREASED PROFITS WITH THE CESSNA 120

1947 CESSNA 120



Increased Profits with the Cessna 120

Same size, range, speed, all-metal construction as the 140, but has less luxurious interior trim and is not equipped with starter, battery, generator, flaps. Only $2695.00 (f. o. b. Wichita).

1 Profitable student instruction can be carried on in winds at least 10 m. p. h. higher than those that ground other light planes.

2 At training R. P. M.'s, gasoline consumption with 85 h. p. compares favorably with that of 65 h. p. trainers.

3 Students prefer this fast, side-by side plane of all-metal structure. You'll have more students more hours per week.

4 Cessna's patented Safety Landing Gear is maintenance-free. Combats ground loops.

5 Students, instructors, operators and buyers all prefer an electric self-starter, which can be added if desired.

6 The Cessna 120 is ideal for cross-country rental or charter work, from 300 to 3,000 miles.

7 Resale value of the 120 is unusually high. It permits frequent profitable turnover of equipment . . . keeps new planes on the line.

8 Teach 'em to fly in the plane they'll buy . . . the Cessna 120—only $2695 (f. o. b. Wichita).

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THE PILOT'S AIRPLANE

MAIL THIS COUPON NOW . . .

Cessna Aircraft Company, Dept. A, Wichita, Kansas

Please send free literature giving complete description of the Cessna 140 and 120 to:

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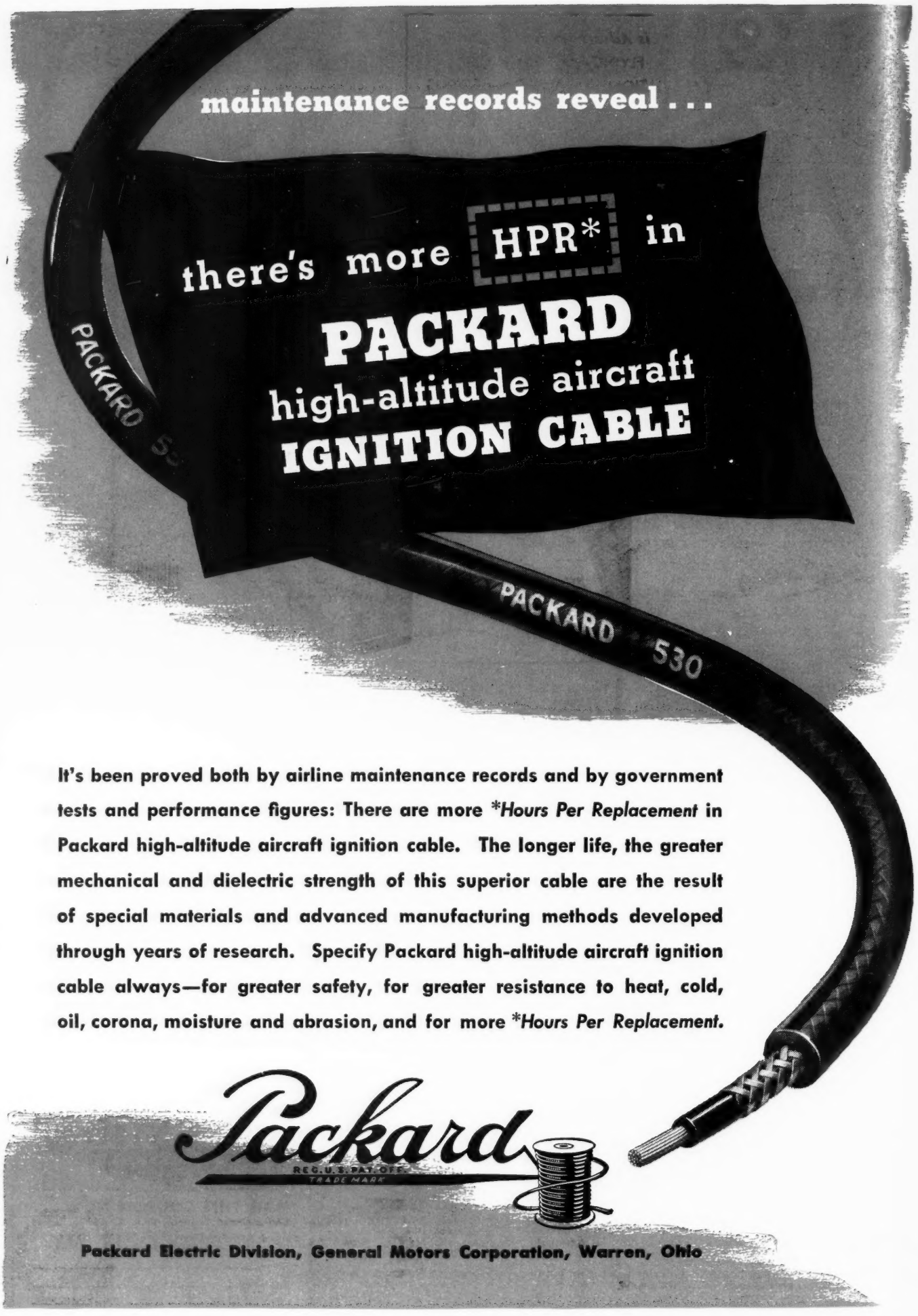
maintenance records reveal . . .

there's more HPR* in

PACKARD
high-altitude aircraft
IGNITION CABLE



It's been proved both by airline maintenance records and by government tests and performance figures: There are more **Hours Per Replacement* in Packard high-altitude aircraft ignition cable. The longer life, the greater mechanical and dielectric strength of this superior cable are the result of special materials and advanced manufacturing methods developed through years of research. Specify Packard high-altitude aircraft ignition cable always—for greater safety, for greater resistance to heat, cold, oil, corona, moisture and abrasion, and for more **Hours Per Replacement.*

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When an Aeromatic* Propeller Gives You More Get-Up-and-Go!

TAKE-OFF: With engine at full throttle, Aeromatic Propeller assumes low pitch automatically . . . gets plane off ground quickly, allows use of full take-off power.

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LANDING: Aeromatic adjusts its pitch automatically for a long flat glide . . . moves to low pitch instantly for a quick pickup if the pilot overshoots the field.

For tops in flying enjoyment, there's nothing like an Aeromatic on your private plane!

IT'S COMPLETELY AUTOMATIC! The Aeromatic Propeller is the *only* completely self-acting and self-contained propeller . . . varies its own pitch automatically for peak performance all the way. There are no extra controls to fuss with . . . no extra instruments to watch.

PUTS MORE PEP IN YOUR PLANE! One-fourth shorter take-off run! One-third higher rate of climb! Greater cruising range and speed! All with less fuel consumption, less engine wear! That's what you get from Aeromatic—"the propeller with a brain."

WRITE FOR INFORMATION! If you own a new plane or plan to buy one, enjoy the extra advantages of an Aeromatic Propeller. Write to your aircraft manufacturer or distributor and see if you can have an Aeromatic on your plane. Or drop us a line for free Aeromatic booklet. Koppers Co., Inc., Aeromatic Propeller Dept., 243 Scott St., Baltimore 3, Md.

Custom-Tailored for the Planes they Fly

They are available now for most new private planes and are being installed on other makes and models.

The Propeller with a Brain for Your Private Plane

Aeromatic

Air Controlled Automatic Propeller

Licensed under patents of Everel Propeller Corp.

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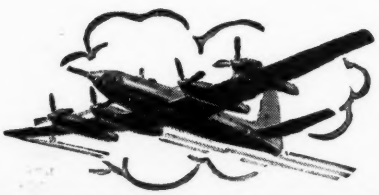
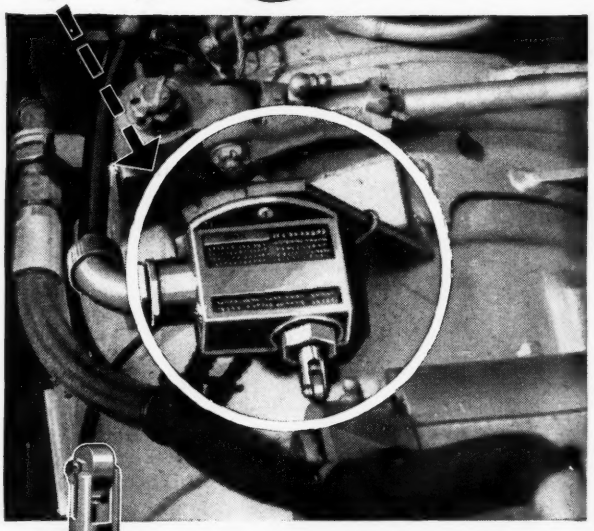
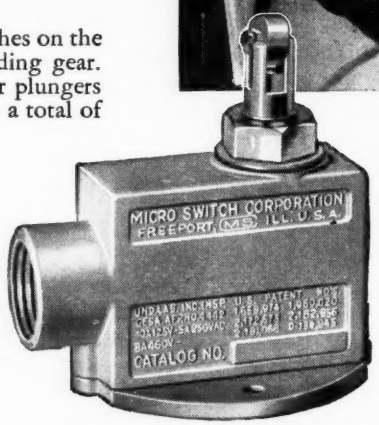
K KOPPERS

Six MICRO Precision Switches

...are used in Landings and Take-Offs by Republic's Long Range XF-12 Plane







●MICRO Precision Switches with their wide range of shapes, sizes, actuators and electrical capacities are widely used in the aircraft industry for multiple purposes.

One of the precision uses for MICRO Precision Switches on the new Republic XF-12 plane is on the retractable landing gear. Here MICRO Precision Die Cast Switches with roller plungers are used for dependability. On the two main wheels, a total of five switches are used in lowering and retracting. These MICRO Precision Switches are actuated by the positive action of the wheel itself.

It is uses like this, where dependability is vital, that MICRO Precision Switches perform with precision, accuracy, and long life.

The secret of the MICRO Precision Switch success and leadership is the "Know-How" behind the manufacture of millions of switches.

If you have a switching problem, feel free to call on experienced "MICRO" engineers for suggestions.

When weight of plane is placed on wheels, a cam actuates the MICRO Precision Switch locking landing gear in down position. When plane's wheels are retracted after take-off the MICRO Switch operates an indicator light which shows the pilot that the wheels are locked in "up" position. A MICRO Die Cast enclosed switch is used with roller plunger as illustrated.

MICRO Precision Switches

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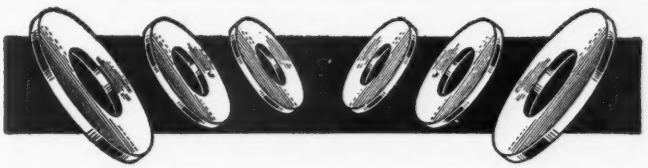

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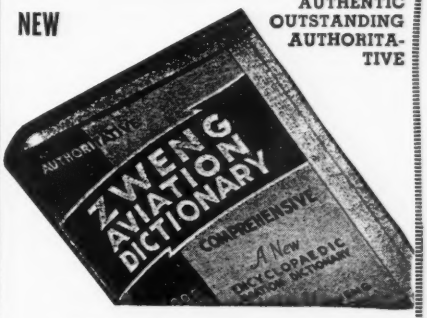

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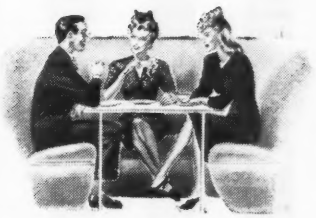
Wherever comfort counts



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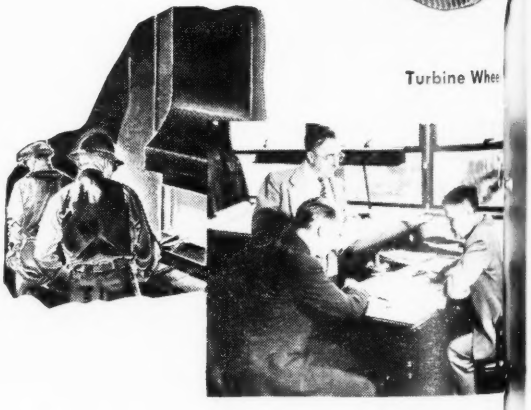

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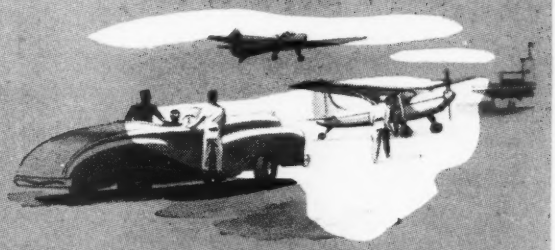

Magnesium lightness is modern, functional lightness—plus shock-resistant strength! Here's further proof of this: Most of America's small plane manufacturers specify magnesium wheels. That's because magnesium wheels are just about one-third lighter, yet they give dependable performance—the kind of performance that magnesium is bringing to diversified products in many industries.

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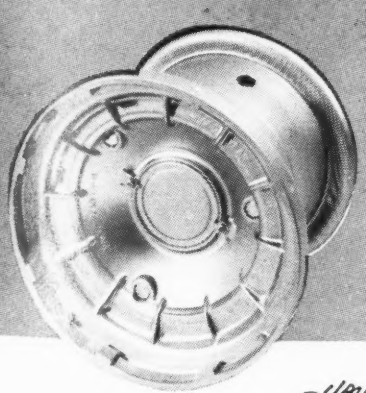
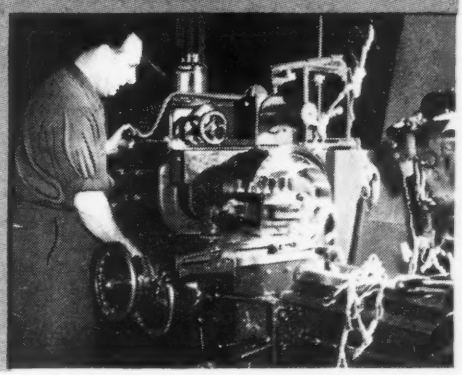


These 6.00 by 6 wheels are die-cast in halves weighing only 1.6 pounds. Manufactured by Goodyear, Akron, Ohio, they withstand 1,200 pounds or more of static load, exceeding design requirements.

Die-casting with magnesium reduces machining on these wheels to a minimum. With magnesium, necessary machining is easily and quickly done. Magnesium saves production time and keeps cost of finished products down.



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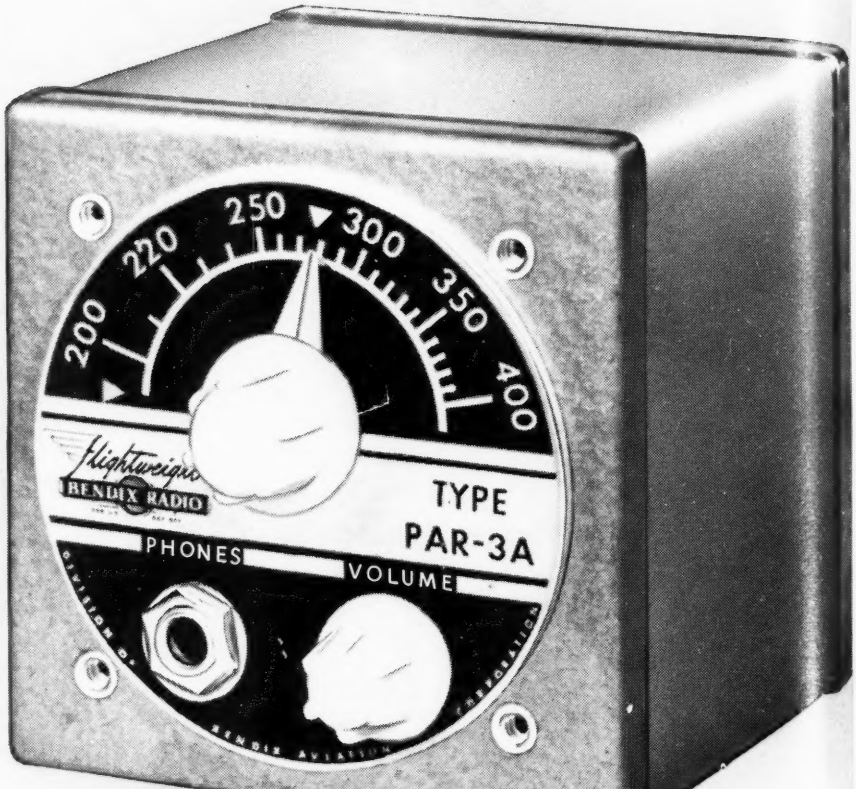

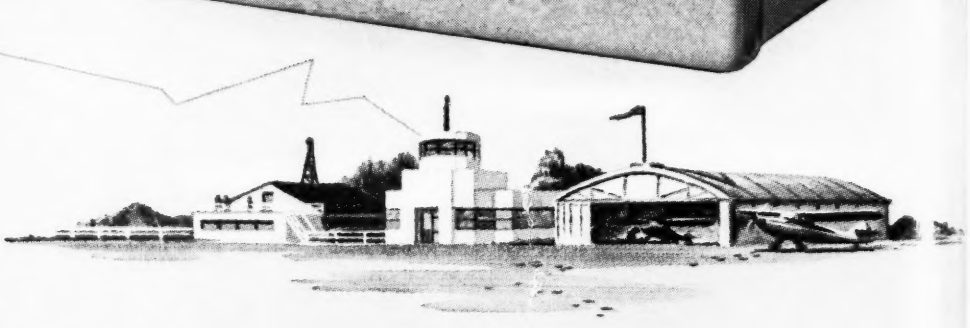

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APRIL 1947
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engineering story illustrates many ingenious features of world's only flying-wing subsonic bomber.

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Sikorsky Helicopters

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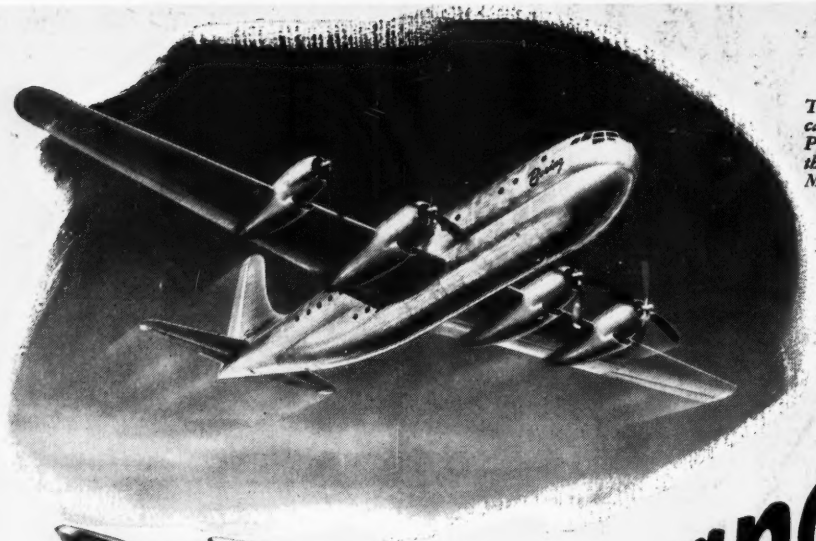

The double-decked Boeing Stratocruiser will carry 80 passengers. Four 3500 horsepower Pratt & Whitney "Wasp Major" engines give this super-transport a cruising speed of 340 M.P.H.

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